OCTOBER 12, 1953

STEEL

THE WEEKLY MAGAZINE OF METALWORKING

No. 8 of a Management Series

SELECT THE RIGHT MATERIALS

—page 129

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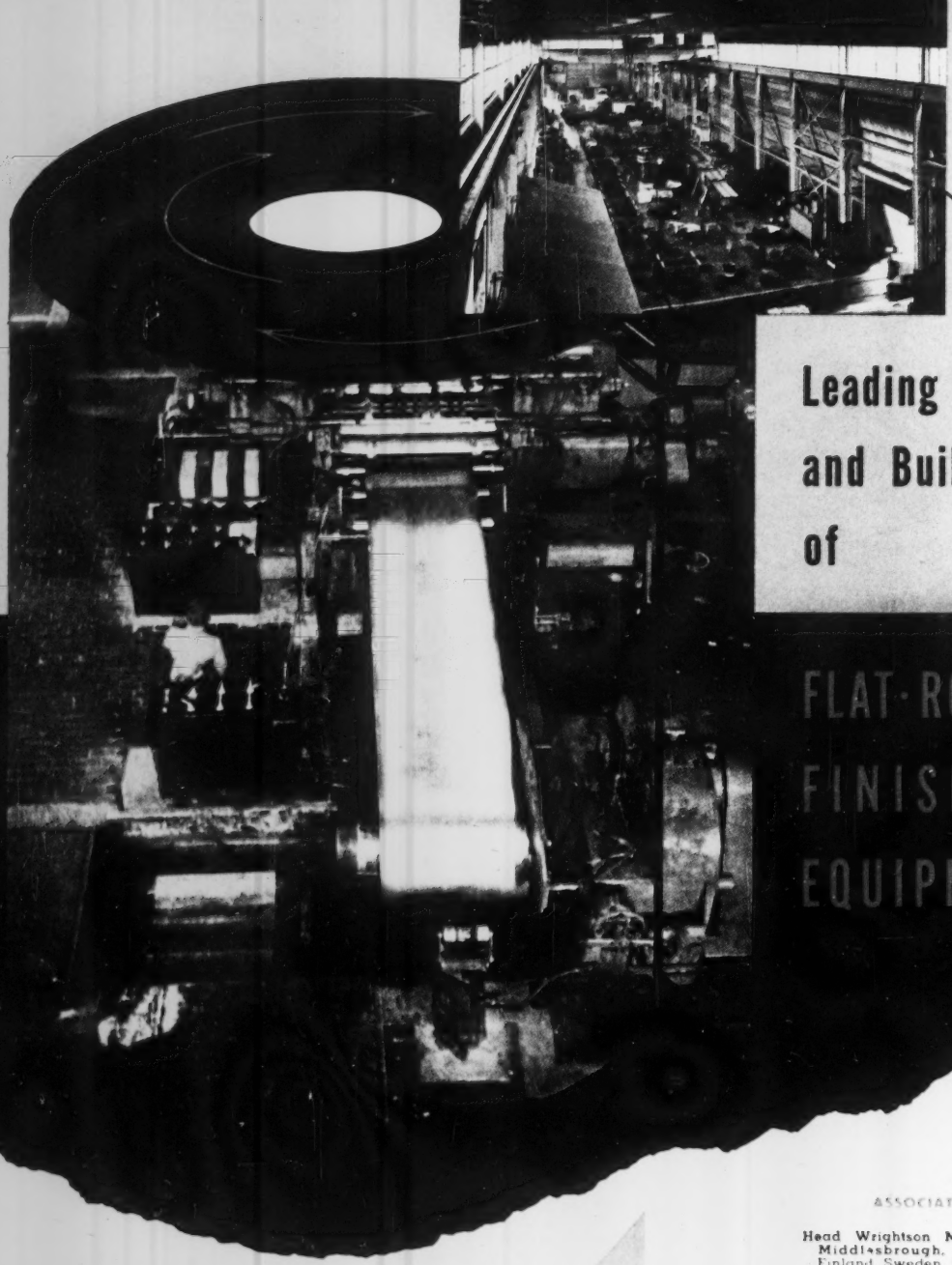
THE AETNA-STANDARD ENGINEERING COMPANY



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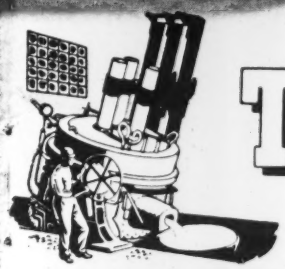
Plants in Warren, Ohio · Ellwood City, Pennsylvania



Tool Steel Topics

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

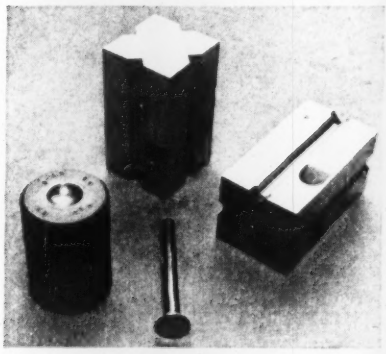
PENCIL SLIPPED . . . DIES BROKE

One of our customers reported his cold heading dies were cracking and spalling. The spalled areas appeared to be the result of the hard case upsetting into the softer core.

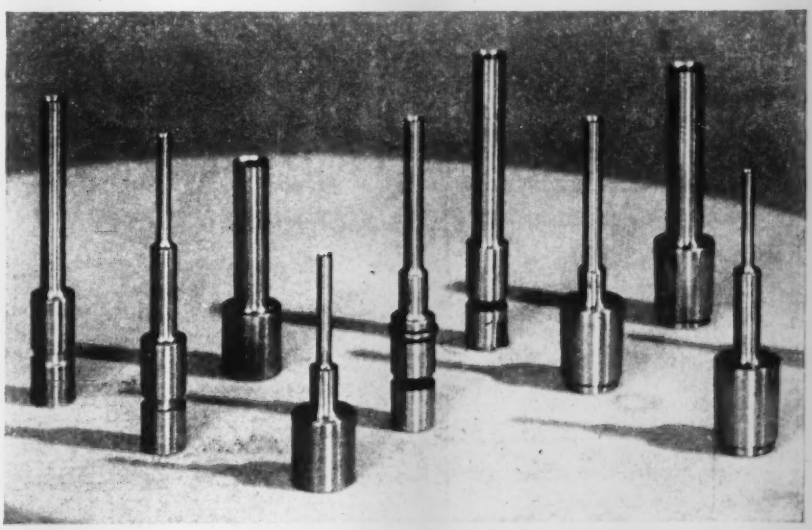
Our metallurgical contact man who visited the customer's plant couldn't find anything out of order, until he happened to read over an order the customer had entered for the steel. Then the light began to dawn.

The answer? The customer had failed to specify "cold heading die quality" on the order. There's quite a difference between ordering "carbon tool steel" and "cold heading die quality steel."

It's the difference between a tool steel that's processed for doing a fine job on severe cold heading and steel that just isn't suitable for this type of special application.



The gripper and header dies shown above, made of Bethlehem XX Cold-Heading Die Steel, have the right combination of hard surface and tough core for cold-heading thousands of steel bolts each day.



"Even the roughest kind of service in binderies and printshops won't break paper drills when they're made of Omega tool steel," says William Gynther of Bent and Gynther, Portland, Ore.

OMEGA HELPS TO STOP BREAKAGE OF PAPER DRILLS

Drilling holes through paper may sound easy, but it isn't. Printers who do much paper drilling will tell you that the drills often break and bend.

The other day we were given quite a fill-in on the subject by William Gynther, one of the owners of Bent and Gynther, Portland, Ore., suppliers of drills to the printing trade. Mr. Gynther told how he once noticed four broken drills on the desk of a prospective buyer. He made a wager that *his* drills wouldn't break, even though this printshop apparently gave the drills pretty severe treatment. The printer took him up — and has n't broken a drill in some years.

The success of the "B and G" drills is attributed by Mr. Gynther to the unique taper inside the drill and to the grade of tool steel (Bethlehem's Omega). Omega is our silico manganese grade of shock-resisting steel, and while it is intended mainly for cold battering tools where terrific shock must be absorbed, it appears to have the ideal hardening properties for these paper drills, together with plenty of the toughness required to withstand stress and strain.

BETHLEHEM TOOL STEEL ENGINEER SAYS:

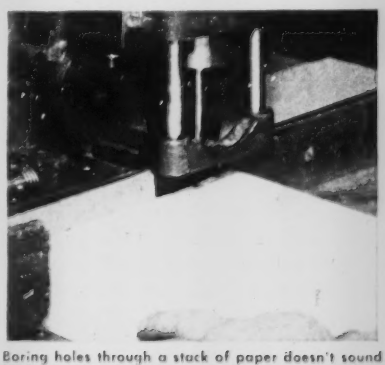
Always temper immediately after hardening

It's always risky to delay or to omit tempering immediately after a hardened tool cools following the quench. With a liquid-quenched steel always get the tool into the tempering furnace as soon as it cools down to about 150 to 200 F; an air-hardening steel should cool to 150 F.

Some heat treaters spit on a tool — if there's no sizzle, it's cool enough to temper. You can also use a contact pyrometer or other indicators to get a more accurate check on the temperature of freshly quenched tools.

If you delay the temper — to check hardness or for some other reason — you're running the risk of permitting stresses to build up. And these stresses may crack the tool in half, even before it reaches the tempering furnace. Of course, such failures don't always occur if this precaution is ignored.

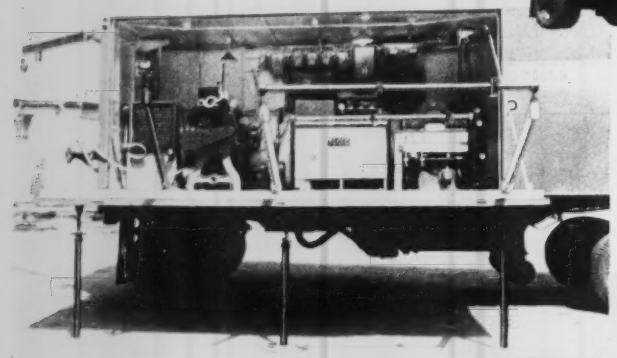
Some people just can't be convinced that it's risky to delay tempering after the tool cools following the quench. But there's no way to predict just when it may happen, so why take the risk?



Boring holes through a stack of paper doesn't sound like a tough job, but there's a lot of stress on these hollow drills which causes frequent breakage — unless they're made of the right steel.

Announcing with "JOY"

Another TOCCO* First:



Induction Heating *on Wheels!*

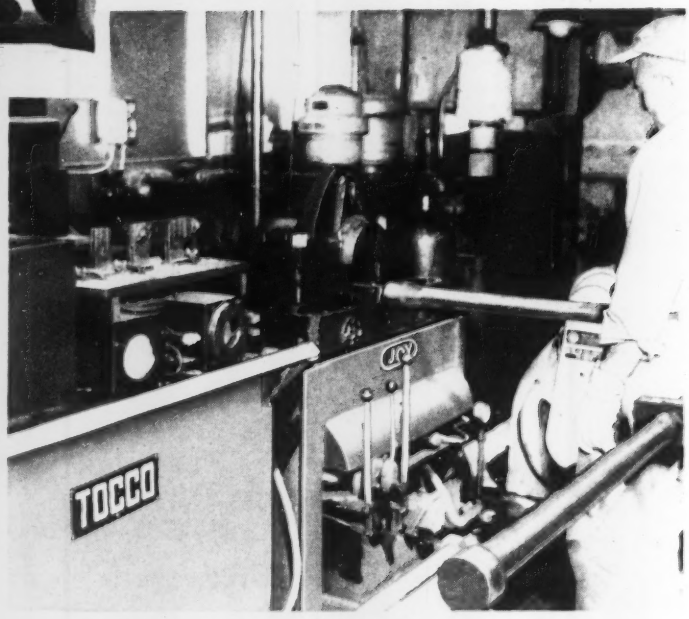
Joy Manufacturing Company's Mobile Shop for on-location reconditioning of mine drill steels.

BECAUSE of the size and length of mine drill steels, (some weigh as much as 320 lbs. and are 30 ft. long) much expense and lost time was involved in shipping them back to the factory for reconditioning. Realizing this problem, Joy Manufacturing Co., Pittsburgh, Pa., decided to send "Mohammed to the mountain" in the form of the *Joy Mobile Shop.*

The purpose of the Mobile Shop is to travel to designated territories in the United States, calling periodically on users of Joy's "Challenger" Drill. All broken drill steels are reconditioned on the spot—saving Joy's customers transportation costs and lost time.

The Joy Mobile Shop carries a 20 KW, 10000 cycle TOCCO Induction Heating machine, powered by a diesel-electric generator. The TOCCO unit heats the drill steels to 2200° F for upsetting, then reheats the upset ends to 1500° F for normalizing prior to machining.

This unusual application story is typical of the way TOCCO engineers team up with American Industry for better products and services, faster—and at lower cost.



Operator guiding drill steel in upsetter after heating end to 2200° F in TOCCO machine at left.

THE OHIO CRANKSHAFT COMPANY

New Technical Film—

If you would like to see our new 30 minute color film—"The TOCCO Story" write on your company letterhead to The Ohio Crankshaft Co., Dept. W-10, Cleveland 1, Ohio.

OSBORN

BEFORE: Closeup of helical gear before deburring.

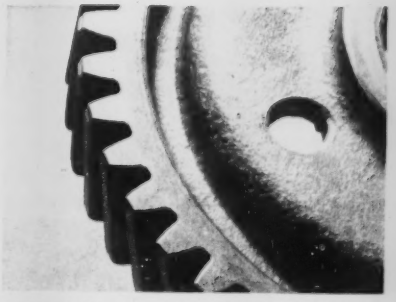
Gone . . . costly thorns in their side

Burr removal by muscle methods is aggravating because it is costly, inefficient and non-uniform in quality. Here's how a truck manufacturer has banished these "thorns in the side" with push-button brushing.

The operation: to deburr, break and blend the flank edges of gear teeth prior to shaving and heat treating. Formerly done with a hand tool, in several operations, the work was tedious and required close inspection and reworking to meet rigid specifications.

Now, an Osborn Brushing Machine in one speedy operation smooths the entire tooth edge . . . produces *uniform blending* of surface junctures of *every tooth*. Result: lower costs and greater precision for *better performance* of the product in service.

Find out how *you* can cut your costs and improve *your* products with power brushing. Call the nearby **O**sborn **B**rushing **A**nalyst or write *The Osborn Manufacturing Company, Dept. G11, 5401 Hamilton Avenue, Cleveland 14, Ohio.*



AFTER deburring with Osborn Brushing Machine.

Osborn Brushes

FREE: New booklet on deburring with Osborn Power Brushing. Write for your copy.

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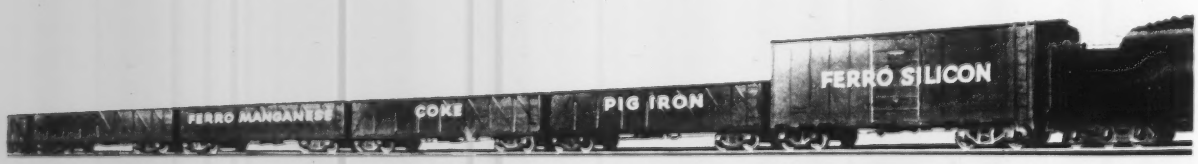
For complete details contact Tennessee Products & Chemical Corp., First American National Bank Building, Nashville 3, Tennessee.



This Week in Metalworking

STEEL

Vol. 133 No. 15 October 12, 1953

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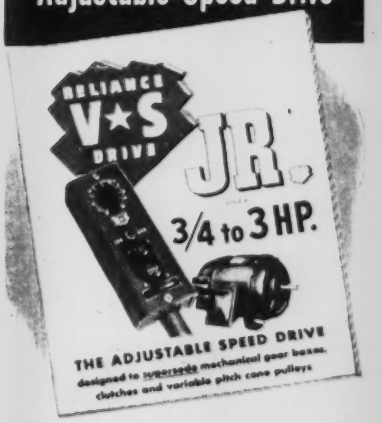
STEP UP PRODUCTION OF SMALL MACHINERY, TOO! ...with this All-Electric Adjustable-Speed Drive



Eliminate mechanical gear boxes, clutches and variable-pitch cone pulleys..

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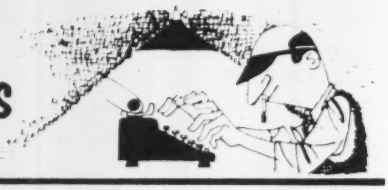
behind the scenes



$37,258 Per Second

Got out our slip stick the other day and began to play around with some figures which we believe you will find not only startling but significant as well.

A sum as large as $117,500,000,000 is difficult to comprehend for most of us nickel and dime folks. So, when we say that this Papa Bear figure represents the total number of dollars that will be spent on products of the metalworking industry in 1953, it may mean very little to you.

To make your comprehension easier, let us put it this way. If you are a normal reader, you can read light material at a rate of approximately 300 words per minute. Therefore, during the time it has taken you to read this far on this particular item, the American consumer has spent a total of more than $111,771 for products of the metalworking industry. For each additional second around the clock another $37,258 will be spent through the remainder of this year.

Seconds are fleeting; Are you getting your full share of this giant metalworking market?

Management Series, No. 8

May we direct your attention to page 129 in this issue to the article "How to Select the Right Metallic Material for the Job."

This is No. 8 in STEEL's Management Series and brings you a wealth of useful information on such key metallic materials as ductile iron, new steels for bearings, stainless steels, clad steels, precoated metals, copper alloys, light metals, and heat and corrosion resistant materials.

Here is another of those deluxe editorial reports employing STEEL's highly-developed task force reporting technique. More than 100 materials manufacturers were contacted by letter, telephone and in person by the staff of technical editors operating out of regional and home offices.

Dr. Allen Gray, technical editor, then gathered all the material and packaged it into the article as presented here.

Incidentally, reprints of this and each of the other seven installments in this highly popular series are available on request. Their subjects are: Public and Community Relations, Government Relations, Basic and Product Research, Purchasing Methods, New Scientific Approach, How to Do a Better Job for Your Company, Handling and Distribution, Labor and Industry Relations.

My Aching Bankroll

Did you know that it takes from 7 to 10 years for a new material development to progress from the test tube to commercialization? Our authority for this fact is L. R. Hill, assistant manager of Westinghouse's Material Engineering Department in Pittsburgh (Thank you for the photo on page 129 of this issue).

Mr. Hill tells us that research and development work has grown so complicated that a good idea is "no more than a hunting license" or, in other words, a preliminary to the expenditure of thousands or even millions of dollars in preliminary survey.

But that's only the beginning, apparently, for it then requires additional expenditures of as much as ten times the pilot study outlay to commercially exploit the idea in a market that may not be receptive to it, market surveys notwithstanding.

All embryo inventors take cover!

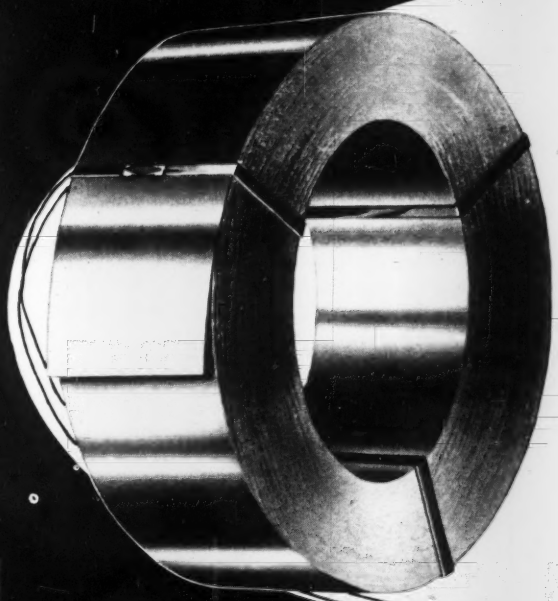
Letterhead

Our editors upstairs report that they just received a letter from the Shadow Hours Foundation for Orphan and Half-Orphan Girls Ltd. A member of that group was submitting a story on the Japanese steel industry.

Shrdlu

(Metalworking Outlook—Page 79)

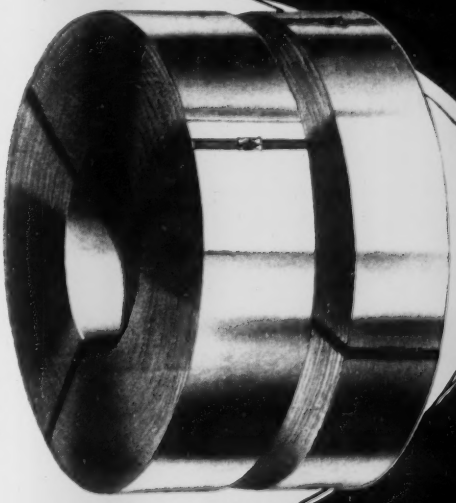
SHARON low alloy high strength STEELS



N·A·X

SHARON N-A-X—An all purpose high strength steel with 50 percent greater strength than mild carbon steel. Sharon N-A-X permits the use of thinner sections . . . resulting in lighter weight products. A low alloy steel, it possesses good corrosion resistance and has high fatigue and toughness values at normal and sub-zero temperatures. It can be readily formed into the most difficult stamped shapes and has good welding characteristics. Available in hot and cold rolled strip.

COR·TEN



SHARON COR-TEN—A ductile, low carbon, non-hardening open hearth steel that combines good corrosion resistance characteristics with a high tensile strength. Sharon COR-TEN resists abrasion and impact—takes paint well. Here's a steel that will reduce product weight and at the same time provide longer wear at relatively low cost with little or no change in regular shop procedure. Available in hot and cold rolled strip.

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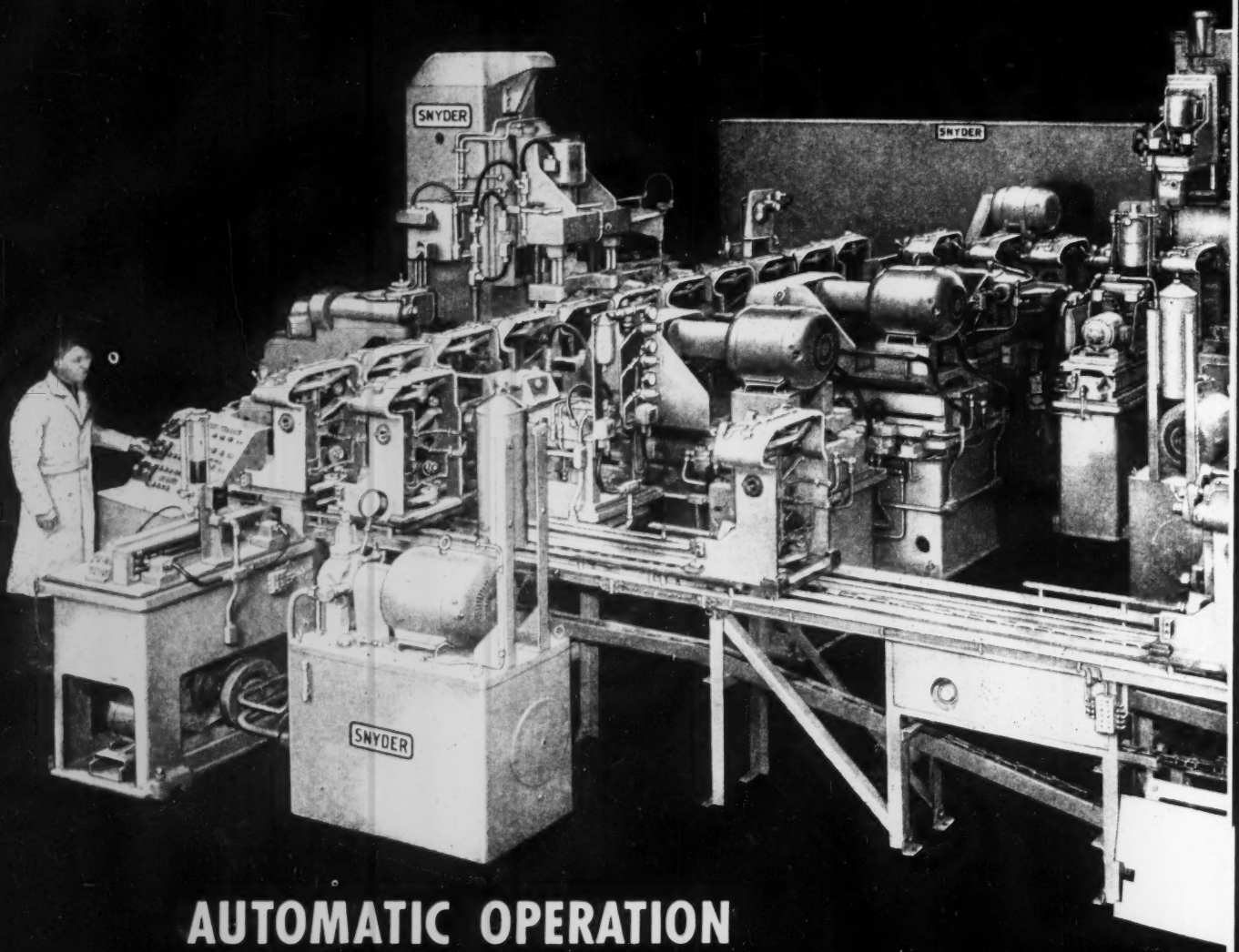
● SERVICE Sharon maintains an engineering department specializing in high strength, low alloy steels. This service is ready to assist you with your steel problems. No obligation, of course. Just write to Sharon Steel Corporation, Sharon, Pennsylvania.

SHARON STEEL CORPORATION *Sharon, Pennsylvania*

SNYDER MACHINES CONTROL COSTS

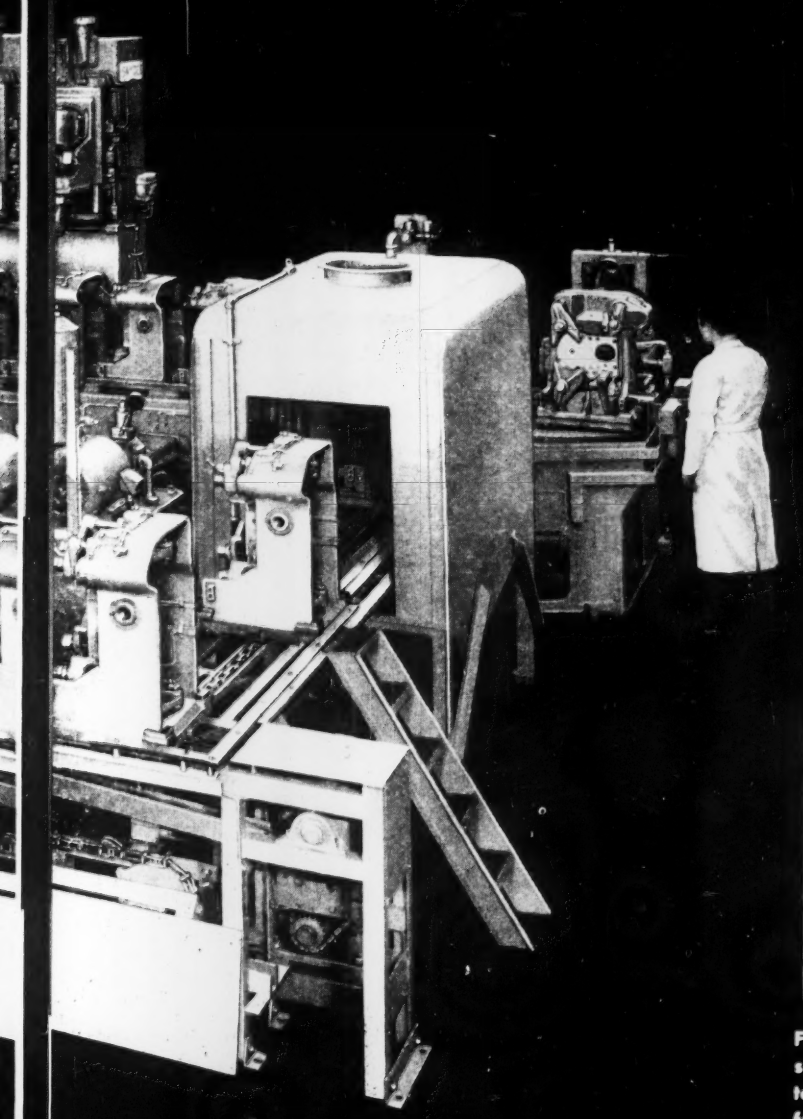


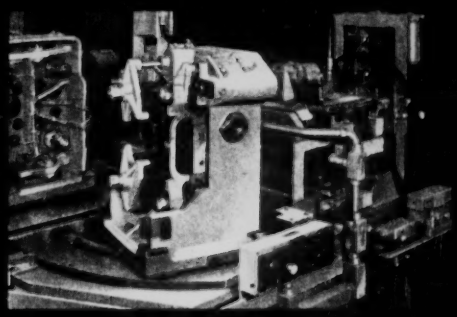
AUTOMATIC OPERATION

MILLS, DRILLS, TAPS, BORES, COUNTERBORES, COUNTERSINKS FRONT COVERS FOR AUTOMOTIVE ENGINES • AUTOMATIC INDEXING, LOCATING, CLAMPING, AND RELEASING • AUTOMATIC TRANSFER THROUGH TWO-STAGE, CONTINUOUS WORK CYCLE • AUTOMATIC CONTROLS • AUTOMATIC SAFETY INTERLOCKING SYSTEM • AUTOMATIC LUBRICATION • AUTOMATIC CLEANING AND CHIP REMOVAL • SKILLED OPERATORS NOT NEEDED

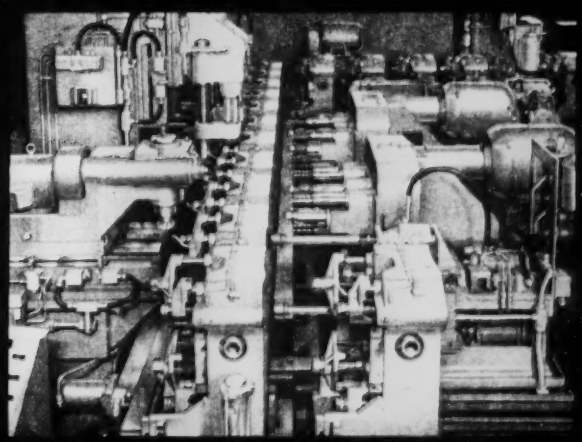
18 STATION AUTOMATIC TRANSFER

180 FRONT COVERS AN HOUR AT 100% EFFICIENCY





At Station 18 the fixture is rotated 90°, air wrenches unclamp the part so that it is easily removed. The fixture returns to Station 18, engages the return conveyor, is automatically blown clean and returned to the loading station.



Fixtures leaving Section 1 (above) move at right angle so that the other faces and top of the part are exposed to tools. The part enters the work cycle with three ground faces, leaves it ready for assembly.

SNYDER

3400
E. LAFAYETTE

TOOL & ENGINEERING COMPANY

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The structural soundness and uniformity of Keystone "Special Processed" Cold Heading Wire is attained by careful selection of raw materials, our own exclusive drawing and heat treating process, rigid quality controls and inspections under the vigilant direction of Keystone's metallurgical staff.

The excellent flow properties of this wire assures the desired upsetting and die forming characteristics required for efficient cold heading; longer die life; increased production; and a higher quality finished product.

Compare the performance of Keystone "Special Processed" Cold Heading Wire next time you have an unusually difficult cold heading problem to solve.

INDUSTRIAL WIRE SPECIALISTS

Keystone Steel & Wire Company
PEORIA 7, ILLINOIS

LETTERS TO THE EDITORS

Note for Specs Handbook

Your Specifications Handbook contains a foreword in which those who use it are encouraged to report errors noted.

May I suggest that you check pp. 48 and 49 in regard to the phosphorus content of AISI type 347 given as minimum 0.11 and maximum 0.17. AISI handbook gives 0.04 maximum for type 347. AMS 5646B and AMS 5512-B give 0.04 maximum. A182-49TF8C gives 0.04 maximum. It looks as though the last item on p. 48 and all items but the last on p. 49 should be checked for the phosphorus content figures.

This handbook is extremely handy, its editing being commendable. No doubt its reliability will be firmly established after errors have been noted and corrected.

We who use this book appreciate the effort that went into the assembling of so much data and realize that in spite of the checking and rechecking that went into the work it would be unreasonable to expect that it would be perfect.

My personal appreciation of the value of this manual is hereby extended.

H. P. Lewis
materials engineer
Thomson Laboratory
Apparatus Department
General Electric Co.
West Lynn, Mass.

• *Thanks for calling this matter to our attention. The phosphorus values given for the last line on p. 48 and the entire p. 49 with the exception of the last line are in error. You will note that the last line on p. 49 covers specification A167-44, Gr. 6. Phosphorus content is given as 0.035 maximum. This is correct. Also phosphorus values given on p. 50 which refer to the same code number as on p. 49 are correct. —ED.*

Good Books Are Hard To Find

Please send us a reprint of the article "A Job for Management: Better Labor Relations" (Sept. 7, p. 101), seventh in your Management Series.

We get so much good out of your magazine that we will contest the divorce if you ever think of quitting us.

L. H. Schaut
purchasing agent
Keystone Carbon Co. Inc.
St. Marys, Pa.

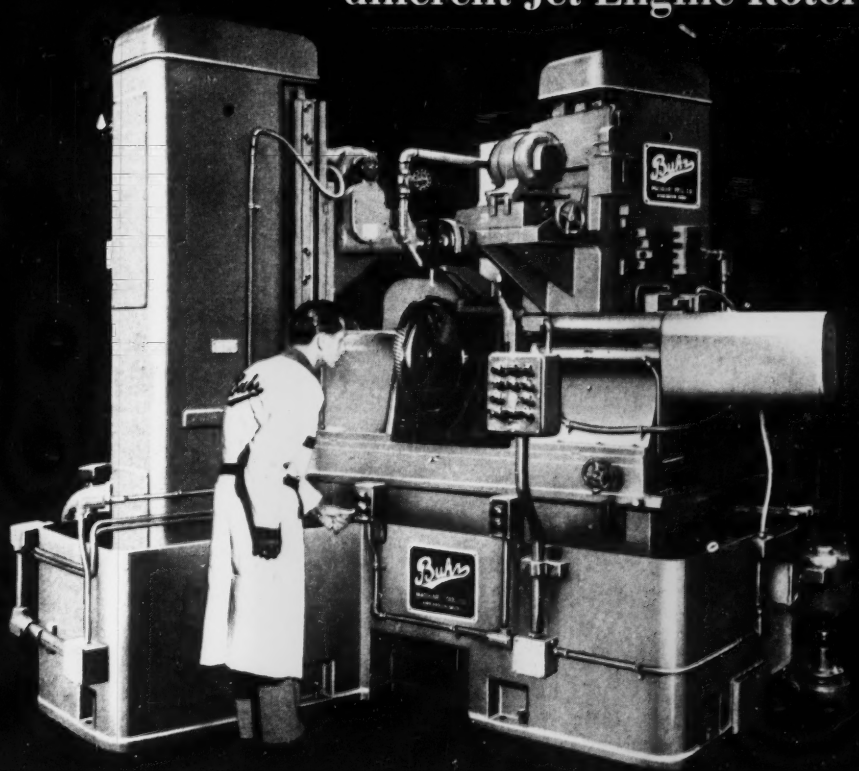
One for the Foremen

We have greatly enjoyed your article "Your Key to Good Plant Discipline: The Foremen" (Aug. 24, p. 49), and are wondering whether it would be possible

Please turn to page 12

Buhr SPECIAL...

Mills both ends of 57 up to 103 slots in 16 different Jet Engine Rotors



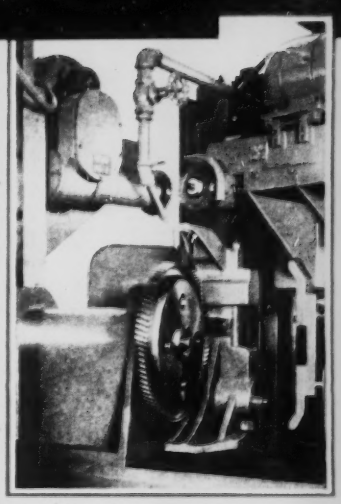
Automatic 2-spindle milling machine, arranged with automatic index for milling both ends of dove-tailed slots.

Equipped with hardened and ground laminated tool-steel ways.

Hydraulic and electrical installations to J.I.C. standards.

Automatic index unit arranged for milling the various stages from 57 up to 103 slots.

Once machine is set up for any one part, operation is fully automatic, including stop when part is finished.



BUHR MACHINE TOOL CO.
ANN ARBOR, MICHIGAN

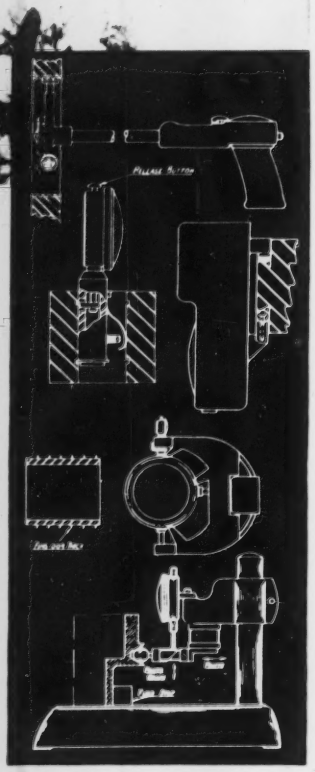
Buhr

MULTIPLE-SPINDLE HIGH PRODUCTION MACHINERY

Gages must be properly matched with your requirements

GETTING THE RIGHT GAGES . . . like marriage . . . is a cooperative arrangement. It requires confidence and close cooperation. You need to take advantage of the gage maker's specialized knowledge in designing and building precision gages—his knowledge of how to magnify and transfer measurement variations precisely, without loss of motion, with a minimum of friction and inertia in the working parts, and the hundred other details which do not concern the usual tool and machine designer.

Many thousands of dollars are wasted annually by designing and building special gages already available as Federal catalog gages or catalog gages with slight modifications. Whether you need an Air or Automatic Gage or a Dial Indicator type, call in Federal when you *start* processing a job and let us engineer your gages for you. Federal Products Corporation, 2110 Eddy Street, Providence 1, R. I.



The above drawings illustrate how catalog gages can be simply and inexpensively modified to suit a special requirement. Why go to greater expense and time? Call FEDERAL.

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LETTERS

Concluded from page 10

to obtain about ten copies for distribution to our general foremen.

W. E. Johnson
works manager
Phoenix Mfg. Co.
Catasauqua, Pa.

Message from the Military

We find your magazine invaluable as a reference to guide us in determining trends. It is a well written and well edited book and we clip many articles from it to circulate throughout the policy making structure of the three Ordnance Corps installations in Detroit. STEEL's editor in the Detroit area calls on us constantly for story material and his articles are of exceptional interest to our personnel in the management level.

Thomas A. Rice
Lt. Col., Ordnance Corps
public information officer
Army Ordnance in Detroit
Detroit

Toys: Storky Story

I think your article "Toy Makers Keep Pace with the Stork" (Sept. 7, p. 63) was a very good one and well done. Naturally the toy industry has its peculiarities in that it does not always follow a general pattern of business. It is, however, somewhat affected by conditions in general.

E. J. Gould
president
Steel Stamping Co.
Lorain, O.

How To Galvanize with Paint

Will you quote us price on 1000 and 5000 reprints of your article "Galvanizing with a Paint Brush" (Sept. 7, p. 158).

P. B. Marsden
sales manager
Sealube Co.
Wakefield, Mass.

• *Quotations have been sent from* STEEL's *Reprint Department.—ED.*

Replacement Copies Needed

We have misplaced our copy of STEEL for July 27, which carried the article on cold extrusion of steel. Since this type of work is of considerable interest to us, we would appreciate having two copies of the article for our files.

G. S. Purple
E. W. Bliss Co.
Chicago

• *They're being sent.—ED.*

Resting Easily

You can rest assured when the time comes to renew our subscription we will gladly do so as STEEL has become a must to our organization.

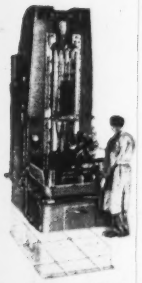
L. T. Blanchet
purchasing agent
Wright Austin Co.
Detroit

what type and size LAPOINTE BROACHING MACHINE do you need?

Whatever it is, you can be sure that it is available among the **more than 50** *types and sizes of broaching machines that are* **standard with LAPOINTE!**

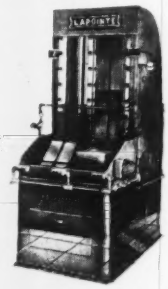
Here are a few machines representing basic designs. They embody engineering skill and broaching experience extending back over fifty years — a wealth of experience exceeding that of every other broaching machine manufacturer.

LAPOINTE can take the responsibility for the *complete broaching problem,* because we also design and build *fixtures* and *broaches* for use on our broaching machines.



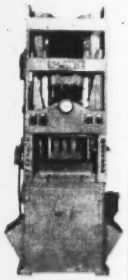
SRV

3 to 25 ton, 30" to 90" stroke



DRV

3 to 25 ton, 30" to 90" stroke



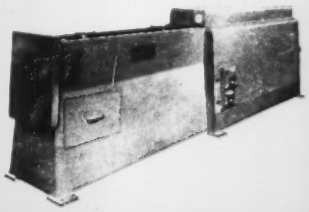
VPU

10 to 25 ton, 36" to 60" stroke

VPD

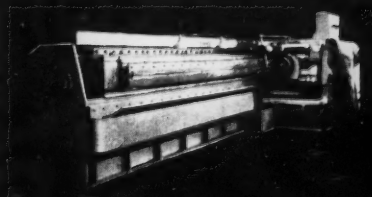
5 to 50 ton, 36" to 60" stroke

Write for Catalog No. 3



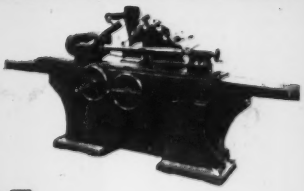
HP

2½ to 50 ton, 30" to 78" stroke



...and here's the *latest* LAPOINTE machine:

SRHE Capable of broaching speeds up to 300 fpm and *more!* Strokes 90" up to 180".



SHARPENERS in these sizes:
36" 60" 72" 80"

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Hobbing
Transmission Gears
350% Faster
1458 Ultra Speed Gear Hobber
GEAR CUTTING
GEAR FINISHING
Complete Equipment
For Gear Production
GEAR LAPPING
GEAR CHECKING

. . . . . headline in Production Engineering & Management January, 1953

"FORD Hobs Gears 350% Faster"

We've checked on it and the editors of PRODUCTION ENGINEERING & MANAGEMENT are right. At Ford Motor Company 3⅛" diameter, 9-pitch, 1⅛" face width transmission gears are being hobbed at a production rate 350% greater per spindle than compared with multiple spindle machines. To do this Ford uses one of the new Michigan Ultra-Speed gear hobbers equipped with double thread accurate unground Michigan hobs. Gears are hobbed two at a time, 58 seconds per pair.

Despite the high output rate, 225 gears are produced per sharpening of the hob. Among the reasons given are that "the machine is of rugged, compact construction, simplified in design, with few gears for the index and main drive and . . . with a maximum spindle speed of 1000 rpm."

Of interest is that better control of surface finish is obtained by easier subsequent shaving. Loading and unloading time is kept to a minimum by hydraulically-actuated expanding arbors. Vibration has been practically eliminated by providing maximum rigidity plus a flywheel to dampen torsional vibration.

For further details, write for Bulletin #1458-52.

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Michigan Tool Company

from blank to finished gear

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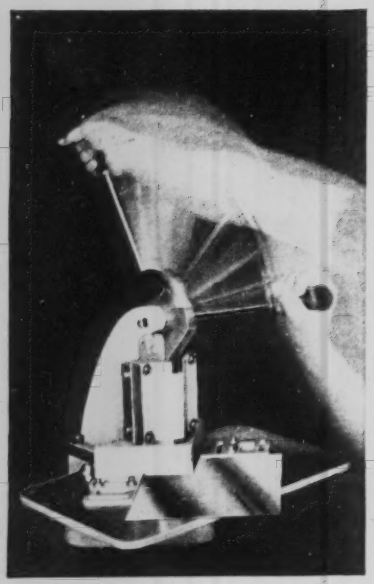

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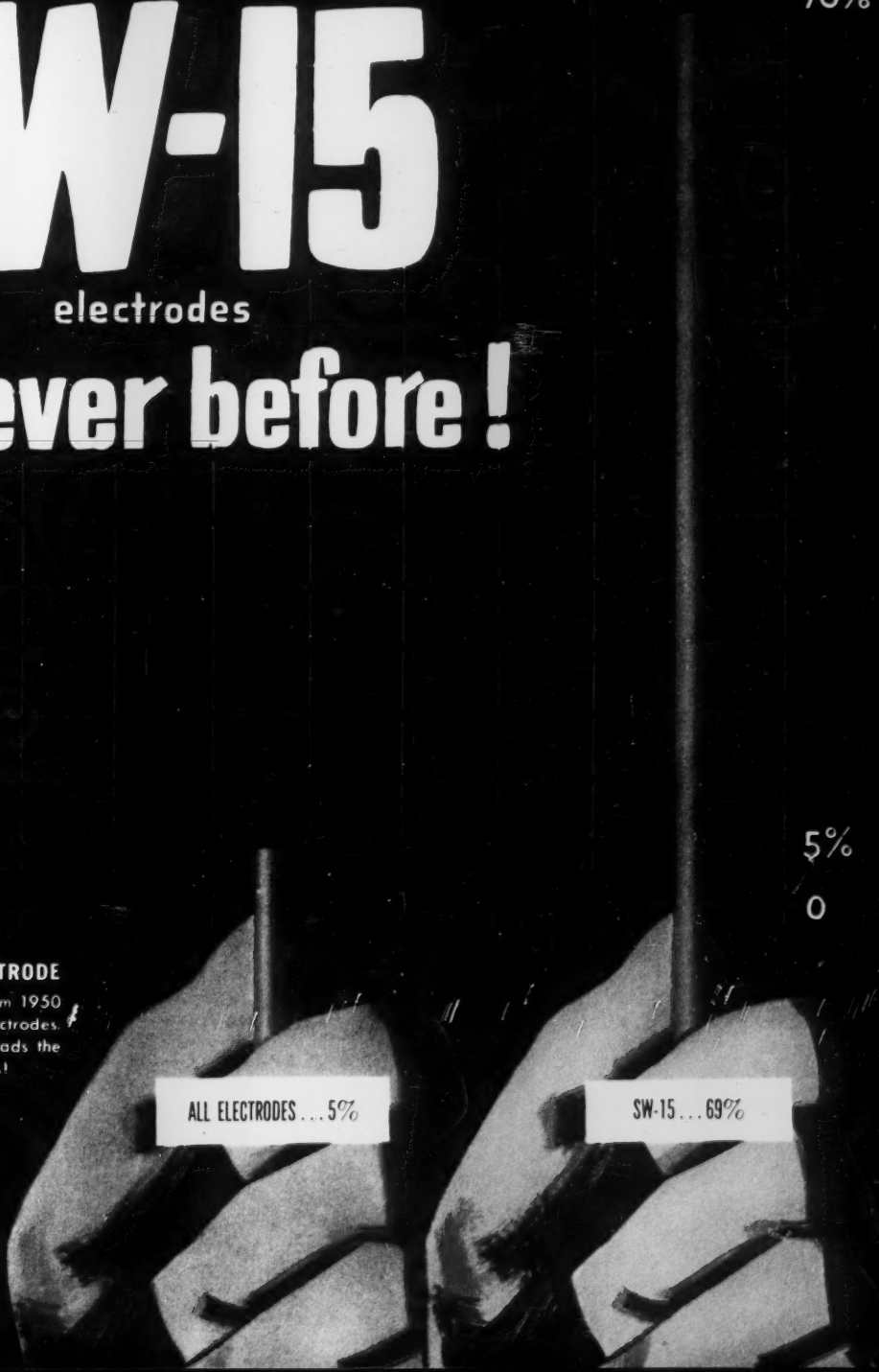
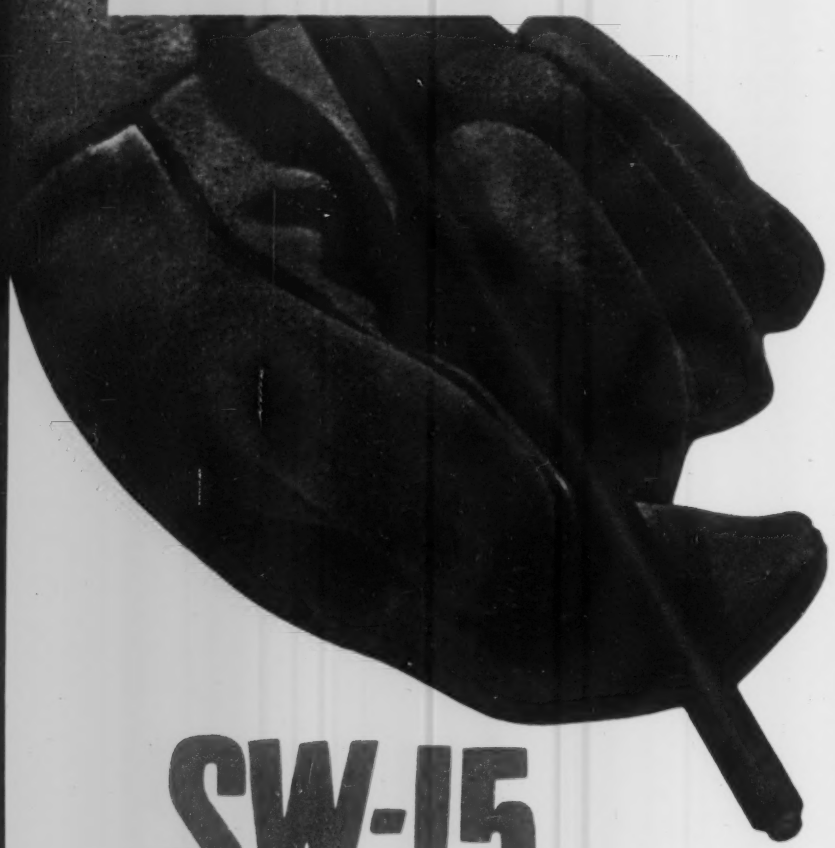
more manufacturers are using SW-15 electrodes than ever before!



FASTEST GROWING ELECTRODE

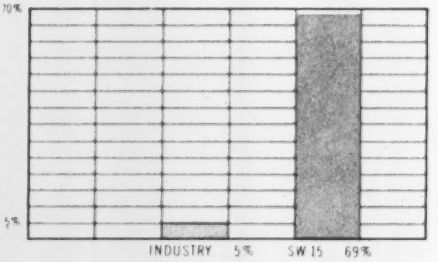
The chart shows the increase, from 1950 through 1952, in shipments of electrodes. And the A. O. Smith SW-15 leads the industry's increase by 13.2 times!

more manufacturers are using SW-15 electrodes than ever before!



SW-15

the UNIVERSAL Electrode



Here is the evidence of SW-15's growing acceptance among manufacturers who depend on welding in the fabrication of their products. SW-15 showed a 69% increase in acceptance and use, as compared with but 5% for all electrodes produced by the welding electrode industry from 1950 through 1952.

A few of the principal users of SW-15 are:

J. D. Adams
Allis-Chalmers
E. W. Bliss
Caterpillar
Chicago Bridge & Iron
Fruehauf Trailer
Graver Tank & Mfg. Co.
The Heil Company
Illinois Central Railroad
Ingersoll Rand
Iowa Iron & Steel
Kansas City Structural Steel
Link Belt Speeder
Omaha Steel
Pullman Standard Car
Santa Fe Railroad
Sheffield Steel
Trackson Company

Others are joining these every month to share the many benefits which the SW-15 electrode provides their welding operations.

SW-15 was developed as a universal type electrode which could be used for an extremely large number of welding applications. There is nothing else like it among mild steel welding electrodes!

It performed its first welding job in 1939, when it was taken into the field to weld refractory towers and sustaining structures usually welded with an E6010 electrode. It bettered the standard welding time by 50%! Its unusual ease of manipulation won over welding operators and management at once. New operators were readily trained with the SW-15. Its x-ray quality set new inspection records.

Two years later, SW-15 was welding on E6012 applications in the farm machinery and heavy road equipment fields. Excellent weld appearance, easy slag removal, little spatter, good bead with no undercut helped improve the products of these manufacturers.

Manufacturers found that due to SW-15's ease of manipulation, operators avoided slag inclusions, fish-eyes and voids, even in welds made in the field. This greatly improved the appearance of products it was used on and enhanced the reputation of the SW-15 electrode.

SW-15 is just one of the welding electrodes in the A. O. Smith line. There's an A. O. Smith electrode for every welding requirement:

MILD STEEL		HIGH TENSILE		LOW HYDROGEN		STAINLESS		STAINLESS	
AWS Class	A. O. Smith	AWS Class	A. O. Smith	AWS Class	A. O. Smith	AISI Class	A. O. Smith	AISI Class	A. O. Smith
E6010	SW-10	E7010	SW-75	E6016	SW-64	502	SW-151	310	SW-359
E6011	SW-14	E7010	SW-80	E6016	SW-65	505	SW-152	310	SW-169
E6012	SW-11	E7020	SW-76	E7016	SW-84	410	SW-153	310	SW-168
E6012	SW-17	E8013	SW-86	E8016	SW-81	430	SW-154	310	SW-368
E6013	SW-15	E9010	SW-95	E9016	SW-90	308	SW-162	316	SW-160
E6013	SW-16	E9013	SW-87	E9016	SW-89	308	SW-362	317	SW-161
E6020	SW-35	E10013	SW-88	E10016	SW-100	309	SW-166	318	SW-158
		E10020	SW-101	E12015	SW-120	309	SW-167	347	SW-157
				E12016	SW-103	310	SW-159	347	SW-357

THE ONE MILD STEEL ELECTRODE

no other can match!

...in ease of handling

SW-15 is easy for operators of varying skills to use in all positions. Its smoother arc, self-cleaning slag, lack of spatter and freedom from undercutting makes it easy for anyone to produce good looking, sound welds with the least effort!

...in quality of weldments

SW-15 welds have high-strength, high-yield, good ductility and consistent x-ray quality. This extends its use to welding low alloy, high tensile steels such as corten and manten, impossible for electrodes whose physicals can't compete with those found consistently in SW-15 welds.

...in appearance of welds

SW-15 bead appearance is excellent. Operators become more quality conscious, inclined to turn out better welding jobs when they can put in good looking welds so easily. Fine appearing welds aid in the ultimate sale of welded products, build acceptance not otherwise obtainable!

...in usefulness

SW-15 has an unparalleled history of success in many fields. Shipyards, during the war, cut their welding time as much as 50% by actual test and used millions of pounds of SW-15. Farm and construction equipment builders found its ease of application and high resistance to impact desirable, and became large users. Field erectors of vessels and structures adopted SW-15 after testing its speed, ease of application, and x-ray quality in weldments. Every year, more manufacturers turn to the SW-15 electrode to spur production and improve the quality of their welded products.

...in cutting costs

SW-15 is in a class by itself. Elimination of time-consuming slag removal, absence of spatter to be cleaned up, ease and speed of application by any operator, freedom from undercutting, excellent weld appearance that reduces inspection costs, and avoidance of weld repairs, all lower production costs directly. Then, the freedom from worry over possible field failures tops off these reasons for the tremendous use of SW-15 electrodes.

...in your plant

SW-15 has a use in your plant or shop. May we suggest that you write us or contact your local A. O. Smith Distributor for full details and a chance to test this remarkable mild steel electrode.

A.O. Smith way

A.O.Smith

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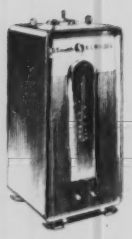
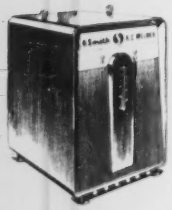


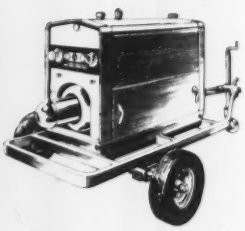
A.C. "CHALLENGER"



A.C. "AUTOMATIC"

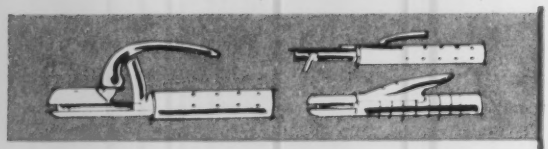
A.C. "UTILITY"

D.C. "RECTIFIER"



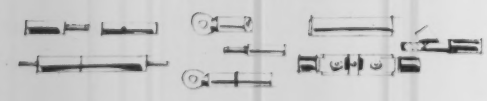
D.C. "FIELD KING"

WELDING SUPPLIES

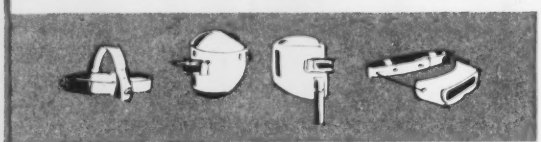


Electrode holders

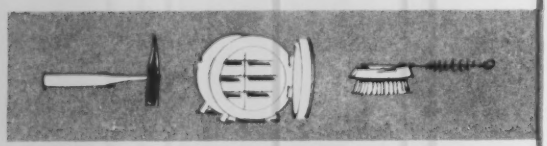
Ground clamps



Cable, connectors, lugs, and splicers



Helmets, shields, headgear, and goggles



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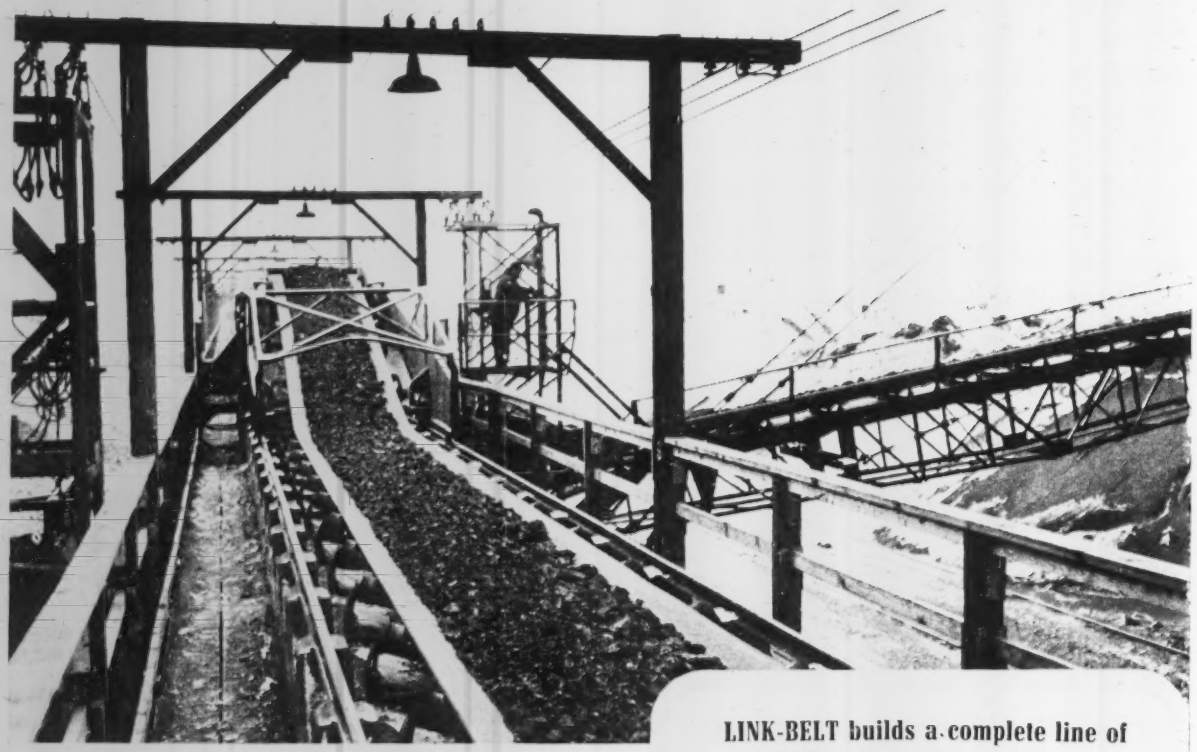
TOTAL ENGINEERING



Steel mill employs Link-Belt belt conveyor system for transporting coal from ship unloading towers to dock storage. Here, Link-Belt tripper discharges 770 TPH of coal from 48-in. wide belt conveyor.

It's your assurance of top efficiency with LINK-BELT belt conveyors

HERE'S how "total engineering" works for you when you use Link-Belt Belt Conveyors. First, Link-Belt conveyor engineers analyze your needs—then recommend the *right* components. In addition, Link-Belt can supply all related equipment—other types of conveyors, feeders, elevators, car dumpers and shakers. And Link-Belt will build your supporting structures and enclosures . . . install the job completely, if desired. Call the Link-Belt office near you for any engineering assistance you need.

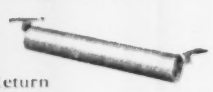
LINK-BELT

BELT CONVEYOR EQUIPMENT

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales offices in Principal Cities.

LINK-BELT builds a complete line of belt conveyor components

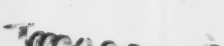
ALL TYPES OF ROLLER BEARING IDLERS



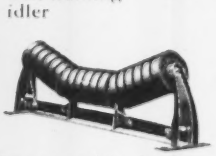
Return idler

20° troughed idler

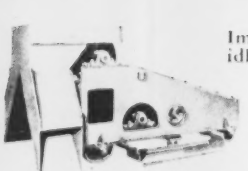
Belt-training idler



Rubber tread return idler

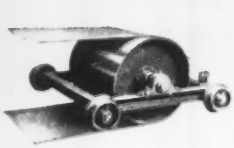


Impact-cushioning idler



BELT AND MOTOR PROPELLED TRIPPERS

COMPLETE TERMINAL MACHINERY



DOLAN Steel Blanks and Strips

CUT TO YOUR EXACT SPECIFICATIONS!

Plus Money Saved On

- estimating and cost controls
- inventory investment
- handling costs
- storage costs
- cutting and labor charges
- overhead

If your requirements call for a 31" x 44" sheet of flat rolled steel, you would realize two pieces out of a standard 36" x 96" sheet. But your scrap loss in this case would amount to over 21% of the total steel bought. This is a prime example of the way Dolan's steel blanks and strips can save you money.

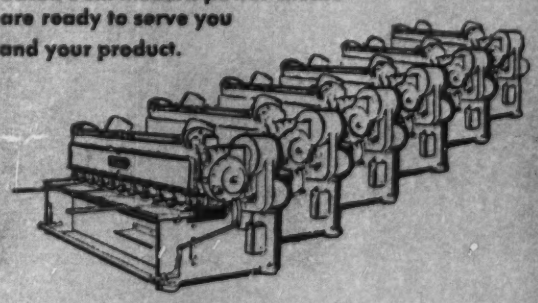
Of uniformly high quality steel in extremely close gauge tolerances, Dolan's steel blanks are cut to your exact size, finish, temper, gauge tolerance and quantity from 28 gauge to 1/4" thick and delivered promptly from stock! *AND NO SCRAP LOSS!*

Phone Dolan Steel now . . . tell us *your* requirements and we'll show you what *your net* savings will be by specifying Dolan's Steel Blanks.

Full Facilities For:

- Shearing sheet stock up to 3/8" thick
- Slitting coils up to 48" wide to your specifications
- Decoiling and leveling steel in gauges from .015 to .187 — widths to 52"
- Supplying sheet and strip steel in all finishes, tempers and gauges

Dolan's six modern power shears are ready to serve you and your product.

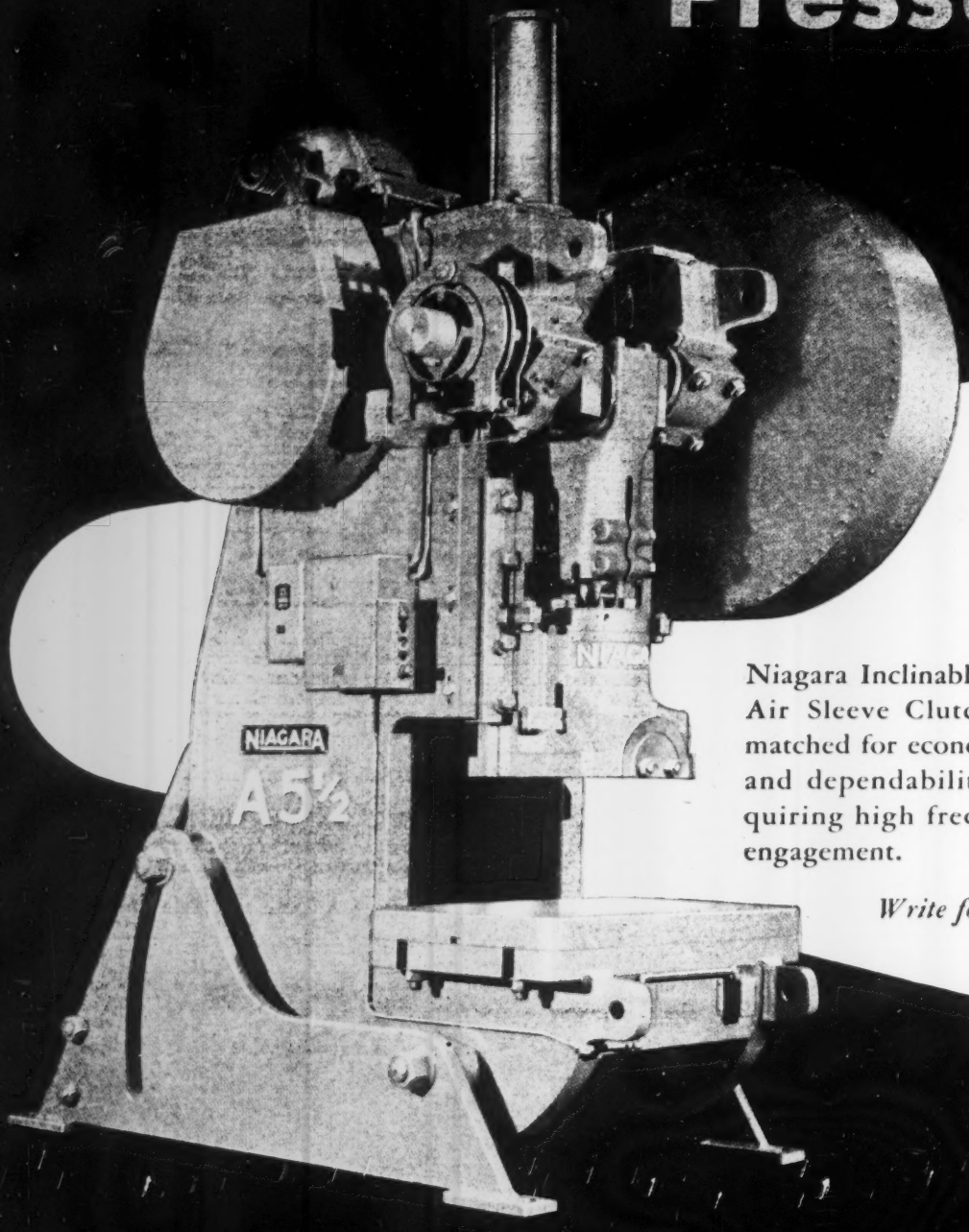


DOLAN *Steel Company Inc.*

810 Union Avenue Bridgeport 7, Conn.
Phone 5-8173

NEW ENGLAND'S LARGEST STEEL WAREHOUSE, FLAT ROLLED STEEL, EXCLUSIVELY, SERVING NEW ENGLAND, NEW YORK AND NEW JERSEY

NIAGARA Inclinable Presses



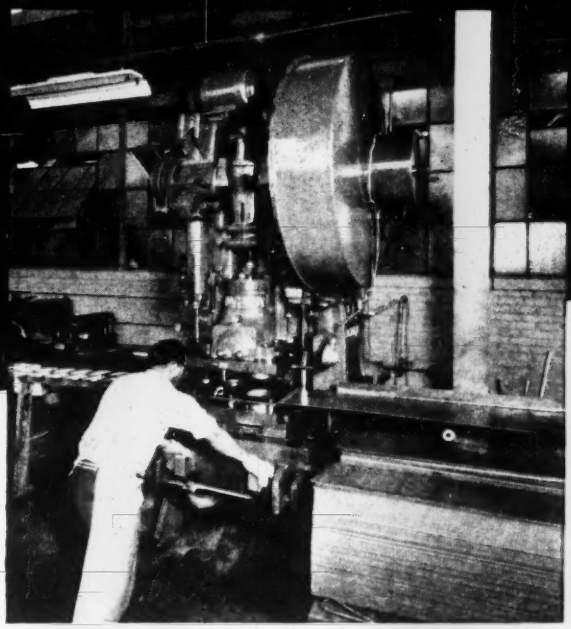
Niagara Inclinable Presses with Air Sleeve Clutch cannot be matched for economy, efficiency and dependability on jobs requiring high frequency clutch engagement.

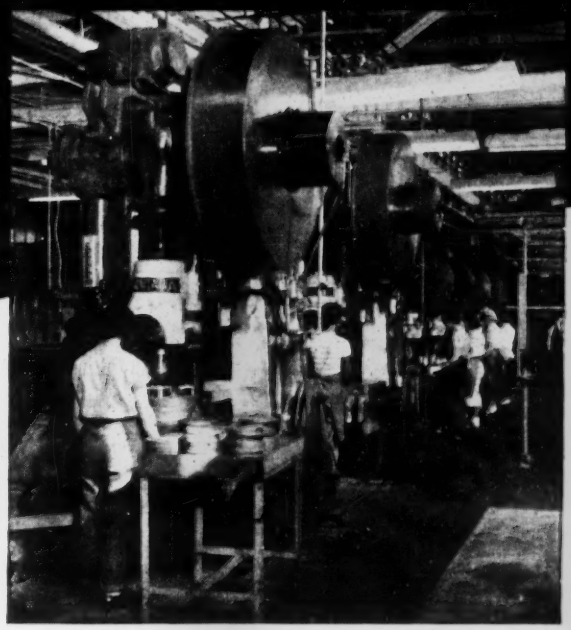
Write for information.

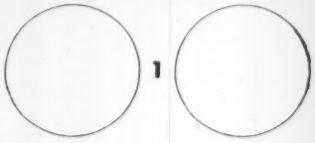
NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.

On the Production Line

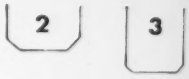
AT SHWAYDER BROTHERS, INC., DETROIT



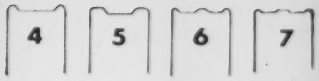




1. Punching two round blanks per stroke on Niagara A-5½ Press with Air Sleeve Clutch.

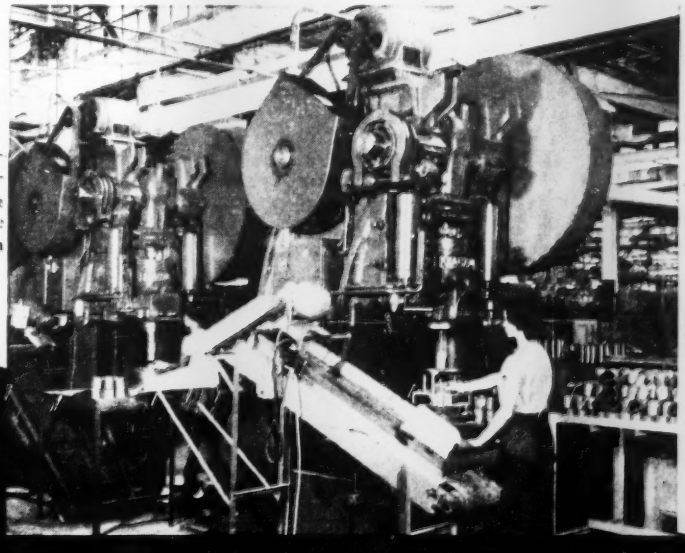


2, 3. Cupping and Redrawing on A-5½ Presses with Air Sleeve Clutches.



4, 5, 6, 7. Indenting end on A-3½ Presses.

8, 9. Forming hexagonal shape and Ironing side wall on A-5½ Presses with Air Sleeve Clutches and with Niagara Cushions.



The final piercing and tapering operations are done on A-3½ Presses (not shown.)

NIAGARA

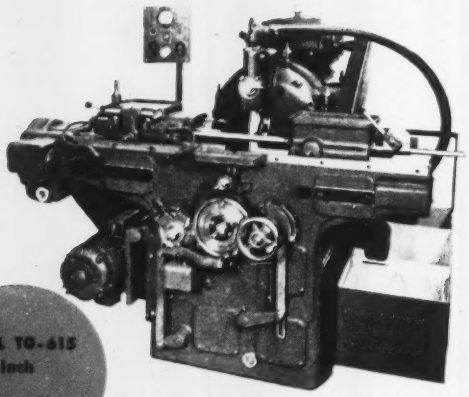
America's Most Complete Line of Presses, Shears, Machines and Tools for Sheet Metal Work

DISTRICT OFFICES: DETROIT • CLEVELAND • NEW YORK • PHILADELPHIA

Dealers in principal U. S. cities and major foreign countries

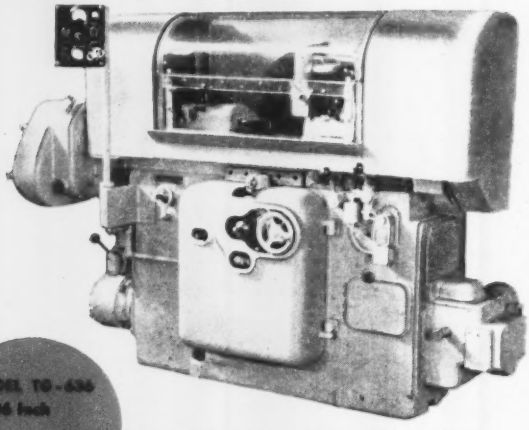
Quality threading

AT MINIMUM COST



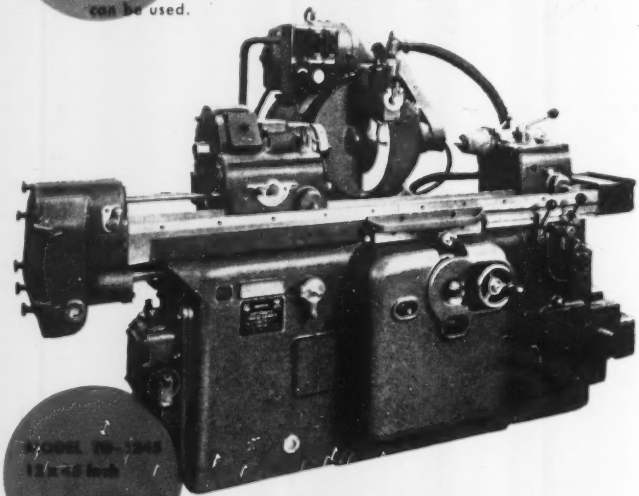
MODEL TG-615
6 x 15 Inch

The 6 x 15 Automatic Thread Grinder is used for high production thread grinding with either single or multi-ribbed wheels on relatively small parts.



MODEL TG-636
6 x 36 Inch

The 6 x 36 machine is extremely versatile and is used on long or short run jobs on a great variety of precision threaded parts. Single or multi-ribbed wheels can be used.



MODEL TG-1245
12 x 45 Inch

The 12 x 45 machine is used for grinding threads on a wide range of work from small to large heavy parts. Single or multi-ribbed wheels can be used.

JONES & LAMSON
AUTOMATIC THREAD GRINDERS:

- Produce threads of better quality and more uniform finish
- Reduce handling cost
- Eliminate costly rethreading after heat treatment
- Eliminate expensive retooling when specifications change
- Reduce cost of gage maintenance

Built-in accuracy and automatic features, make any of these machines a paying investment for toolroom or production line.

- Automatic wheel truing
- Automatic infeed on successive cuts
- Automatic sizing
- Rheostat wheel speed control
- Diamond or crush dressing of wheels
- Multi-ribbed threading
- Right and left hand threading

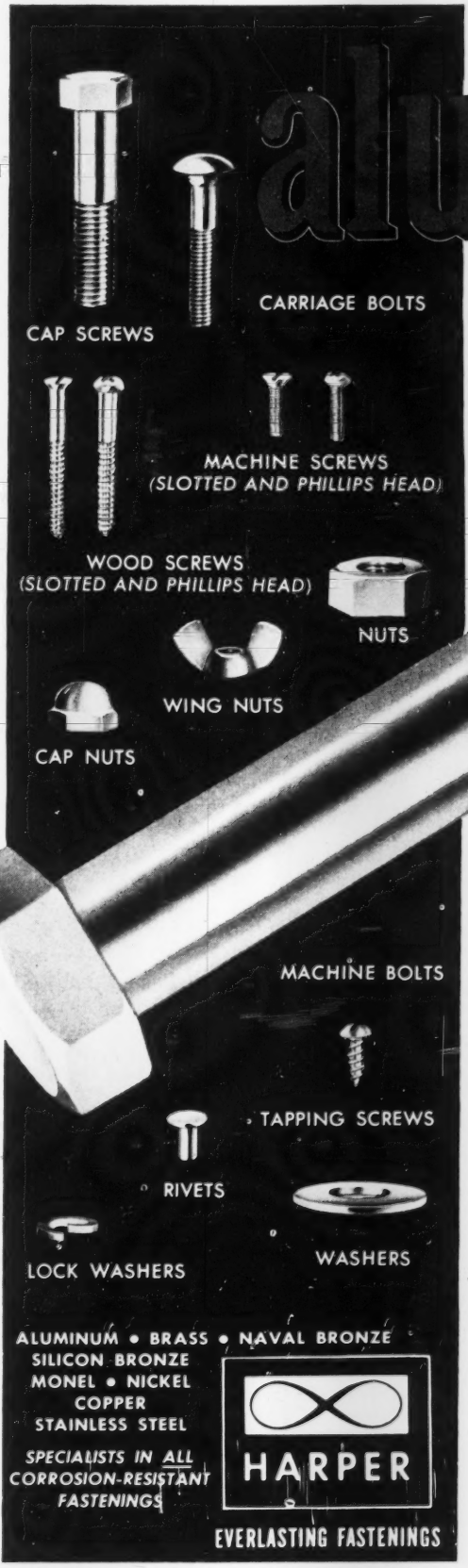
When measuring the value of a thread grinder remember the extra benefits of J & L top-flight construction. Write Dept. 710 for illustrated catalog.

JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., 517 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

THREAD GRINDER DIVISION



aluminum FASTENINGS...

IMMEDIATE DELIVERY!

Make Harper your source of supply for all your needs in aluminum fastenings.

Machine Bolts	Machine Screws (Slotted and Phillips Head)
Carriage Bolts	Tapping Screws
Nuts	Wood Screws (Slotted and Phillips Head)
Wing Nuts	Washers
Cap Nuts	Lock Washers
Rivets	
Cap Screws	

Complete stocks in a wide range of sizes assure you prompt delivery.

The H. M. Harper Company has specialized for almost a third of a century in fastenings of non-ferrous metals and all stainless steels, and is the largest manufacturer in this field. Over 7,000 items are available from stock in aluminum, brass, naval bronze, silicon bronze, Monel and all stainless steels.

Write or wire your requirements in aluminum fastenings to Harper, or mail the coupon for the Harper Aluminum Fastening Catalog.

The H. M. Harper Company
8207 Lehigh Avenue
Morton Grove, Illinois
Please send me the following catalogs:
( ) Catalog on Harper Aluminum Fastenings
( ) Catalog 25 on Harper Everlasting Fastenings

Name.....

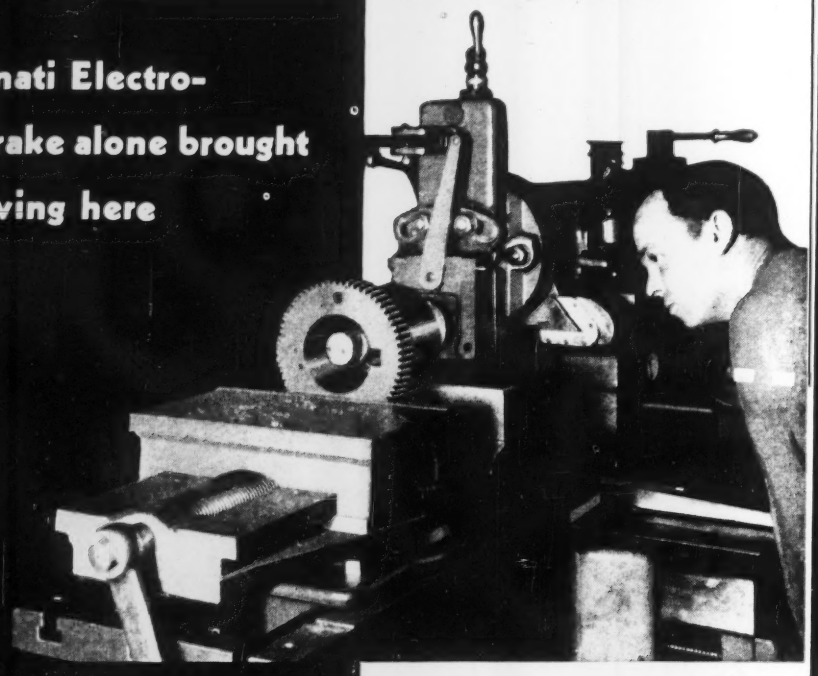
Company.....*Position*.....

Address.....

City.....*State*.....

Outstanding Time Saver...

The New Cincinnati Electro-Magnetic Clutch and Brake alone brought a 30% time-saving here



The New Cincinnati Magnetic Clutch and Brake, with its single, convenient control lever, gives the operator the fastest, simplest and most accurate control of his Shaper and converts waste time into productive time.

This powerful clutch and brake requires no adjustment, and has a long, maintenance-free life.

Write for Cincinnati Shaper Catalog N-5.

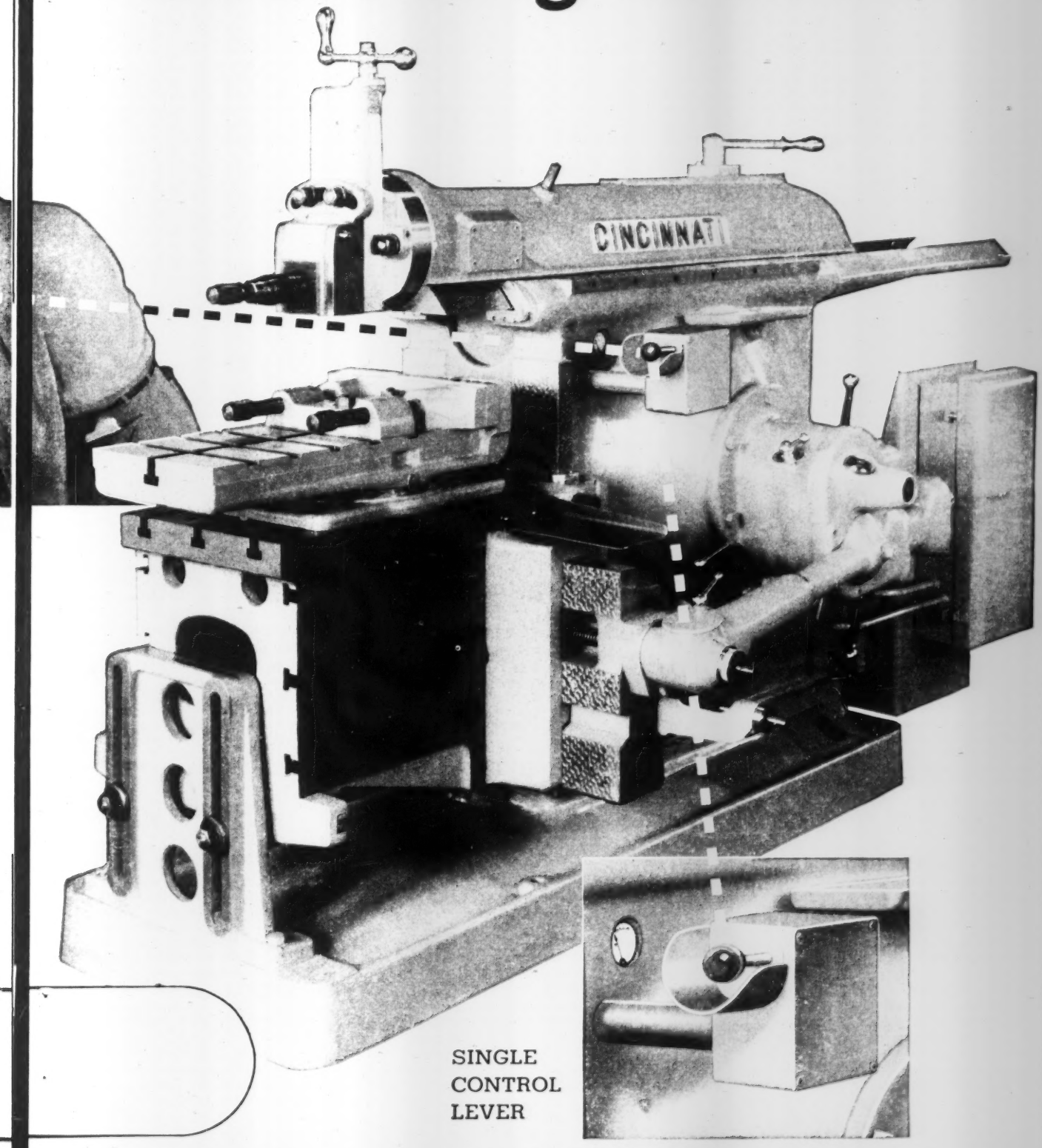
Shaping time on 7 internal oil grooves in these steel sleeves was reduced from 12.5 minutes to 8 minutes, by the Cincinnati Electro-Magnetic Clutch and Brake.

CINCINNATI

THE CINCINNATI SHAPER CO.

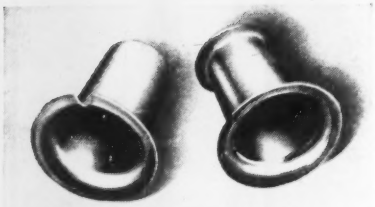
CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

....Outstanding ACCURACY



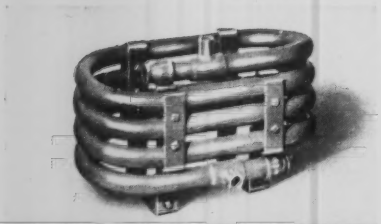
SINGLE
CONTROL
LEVER

Here's why it pays to insist upon *Carpenter* Stainless Tubing



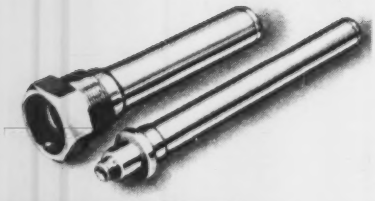
From 50% rejects to 1%!

For this tough flaring job *two* brands of Stainless Tubing were tried with 50% rejects. Then they switched to Carpenter *and rejects dropped to less than 1%.*



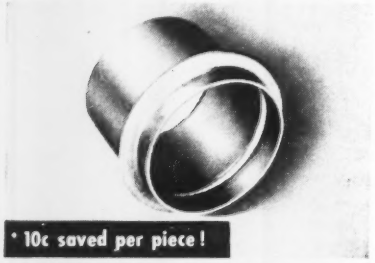
Easier fabrication and a better product!

After testing tube from several sources, the manufacturer of these condensers found that Carpenter's quality control at the mill gave him easier bending and a better finished job.



15% to 20% saving!

These thermostat sleeves and bulbs require precision fabrication. After changing to Carpenter Stainless Tubing they gained *a 15% to 20% saving in the cost of producing each unit.*

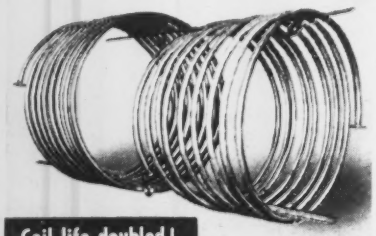


10¢ saved per piece!

The fabricator of this refinery equipment needed a ductile Stainless Tubing that would "take" the severe fabrication. *Since changing to Carpenter, he figures a saving of about 10¢ apiece.*

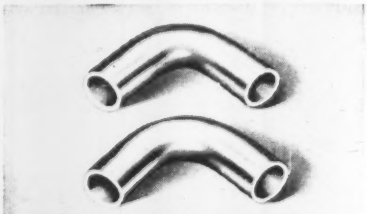
40% rejects before—now, 1%!

Before changing to Carpenter, fabricating rejects ran 40%. Now the collapsible handle of this uranium detector is produced—at a reject rate of only 1%.



Coil life doubled!

In a brick-lined hydrolysis tank, lead coils had been used for years. *Then they found that coil life could be doubled with Carpenter Stainless No. 20.*



From 20% rejects to none!

Rejects because of breakage amounted to 20% of each run. Changing to Carpenter Stainless Tubing, *rejects were completely eliminated.*

These are not unusual or "special" jobs . . . just a few of the many hundred examples in our files of how products have been improved, fabricating problems simplified, and production costs cut by switching to Carpenter Stainless Tubing. They all point up this one significant fact: *All stainless tubing is not the same.*

Whenever any kind of equipment or fabricated part calls for something "extra" . . . in working properties, corrosion resistance, tolerances, finish . . . users of stainless tubing and pipe in a wide variety of industries have learned from experience that they can always count on Carpenter quality and Carpenter technical assistance to meet the challenge.

Prove to *your* own satisfaction that there really is a difference in stainless tubing. Specify Carpenter on your next order. You'll discover, as have hundreds of other users, that there is no "or equal" for Carpenter quality and all-around service satisfaction.

The Carpenter Steel Company, Alloy Tube Division, Union, N.J.

Export Dept.: The Carpenter Steel Co., Port Washington, N.Y.
"CARSTEELCO"

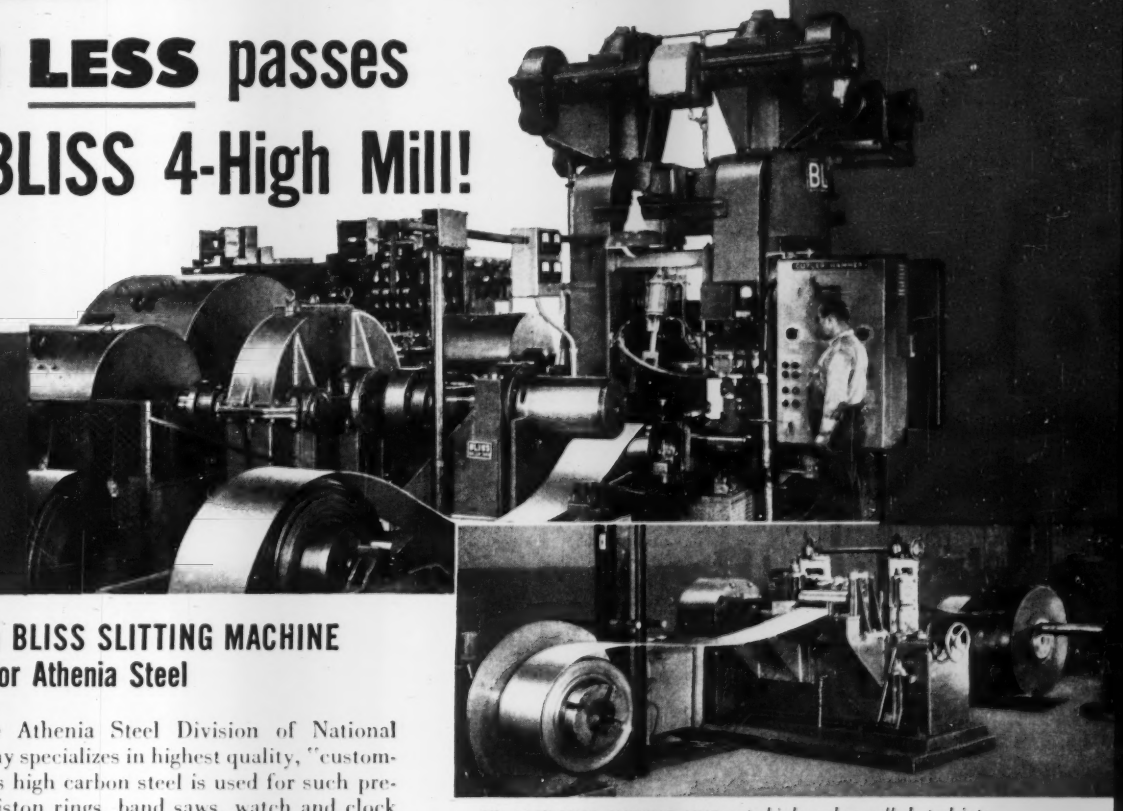
Carpenter

STAINLESS TUBING & PIPE

Analysis · Tolerance · Finish

- guaranteed on every shipment

MORE high carbon spring steel with LESS passes on BLISS 4-High Mill!



Combines with BLISS SLITTING MACHINE to cut costs for Athenia Steel

PROBLEM: The Athenia Steel Division of National Standard Company specializes in highest quality, "custom-made" steel. This high carbon steel is used for such precision parts as piston rings, band saws, watch and clock springs, feeler gages and razor blades. Hence, when seeking to increase production through heavier rolling mill equipment at their Clifton, New Jersey, plant, Athenia specified there must be no sacrifice in the quality of their product.

SOLUTION: Athenia installed a new Bliss 10″ & 24″ x 20″ four-high mill and a Bliss slitting line. Formerly, Athenia's mills could produce steel in widths up to 6½″. The new Bliss mill enables them to roll widths of 16½″ and achieve greater reductions with each pass. These wider strips are then cut into required widths on the Bliss slitting line. *Faster production and lower costs result—at the same high quality level.*

Athenia uses the Bliss mill for breakdown and finishing work. Its effective range is for reductions from 0.125, 0.105 and 0.095 down to 0.015. Officials at Athenia particularly like the mill feature that permits coil "take-off" on either side. They also like the "automatic clamp and sticking device" for entering the metal in the rolls. And they were pleased with the reliable, smooth-starting mechanical and electrical equipment supplied by Bliss.

Whatever your rolling mill problem—large or small, routine or intricate—call Bliss' Rolling Mill Division. Their engineers will be glad to help you. But, today, send for your copy of the revised Bliss Rolling Mill Brochure, soon off the press; it describes Bliss' products and services and contains many valuable production ideas.

9″ x 18″ BLISS SLITTING LINE *cuts high carbon rolled steel into multiple strips of desired width to speed production, and afford full range of selection.*

Remember: BLISS **for Presses, ROLLING MILLS, Special Machinery**

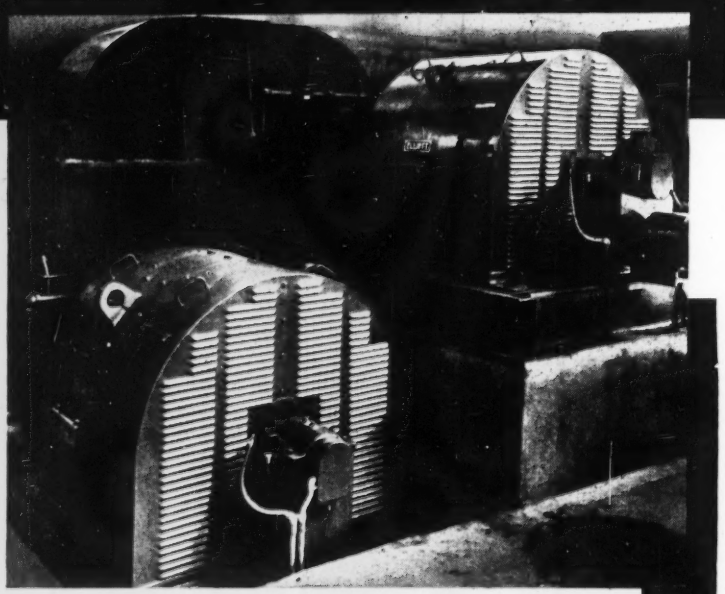
E. W. Bliss Company • General Office: Canton, Ohio

ROLLING MILL DIVISION: SALEM, OHIO

E. W. Bliss (England) Ltd., Derby, England • E. W. Bliss Company (Paris), St. Cyr-sur-Seine, France

U. S. Plants in Canton, Salem and Toledo, Ohio and Hastings, Michigan. Branch Offices in Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Philadelphia, Rochester, Toledo, and Toronto, Canada. West Coast Representatives: Moore Machinery Co., Los Angeles and San Francisco; Star Machinery Company, Seattle. Other representatives throughout the world.

Delivery end of mill, with Elliott 20-hp and 75-hp, 300/1200-rpm reel motors in tandem at right, for adjustable tension on heavy and light strip. Duplicate motors drive reel at opposite end of mill.



Twin drive for mill back-up rolls ▶ with two Elliott 300-hp, 450/900-rpm motors. All machines are designed for fast acceleration and deceleration.

Elliott five-unit 740-kw generator set provides adjustable ▶ voltage power for mill motors and reel motors. Ventilating equipment in background. All machines are force-ventilated.

motors and generators

...drive four new reversing cold strip mills for Revere Copper and Brass Incorporated

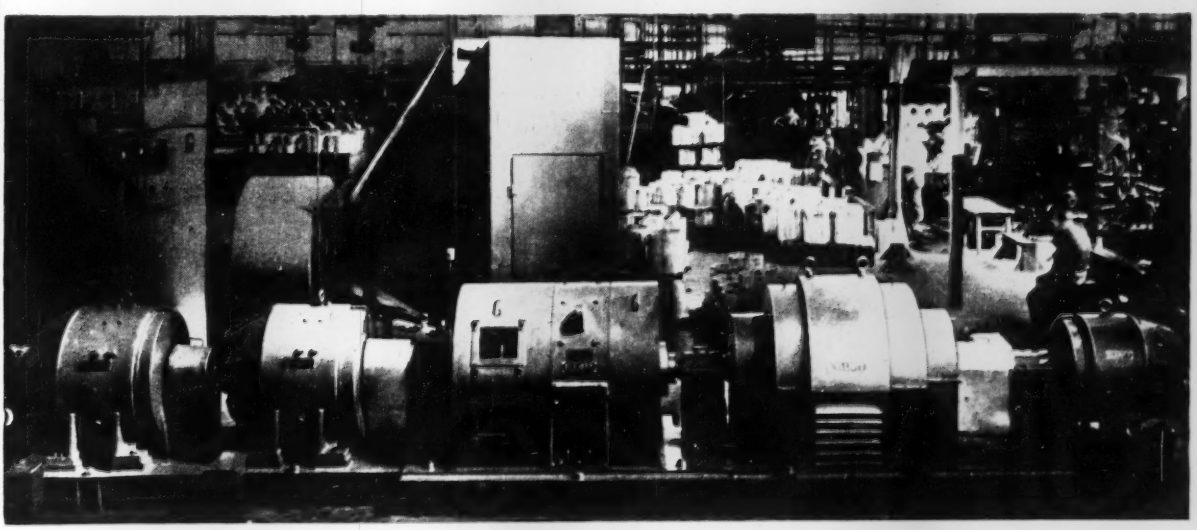
● In these important installations, Elliott supplied not only the adjustable-voltage main drive motors for the four new mills, but also motors for constant-voltage auxiliary drives such as lube drive, screwdown, reel traverse, air-wipe blower, buggyhoist, and roll changer.

Control is Cutler-Hammer, developed in close cooperation with Elliott engineers.

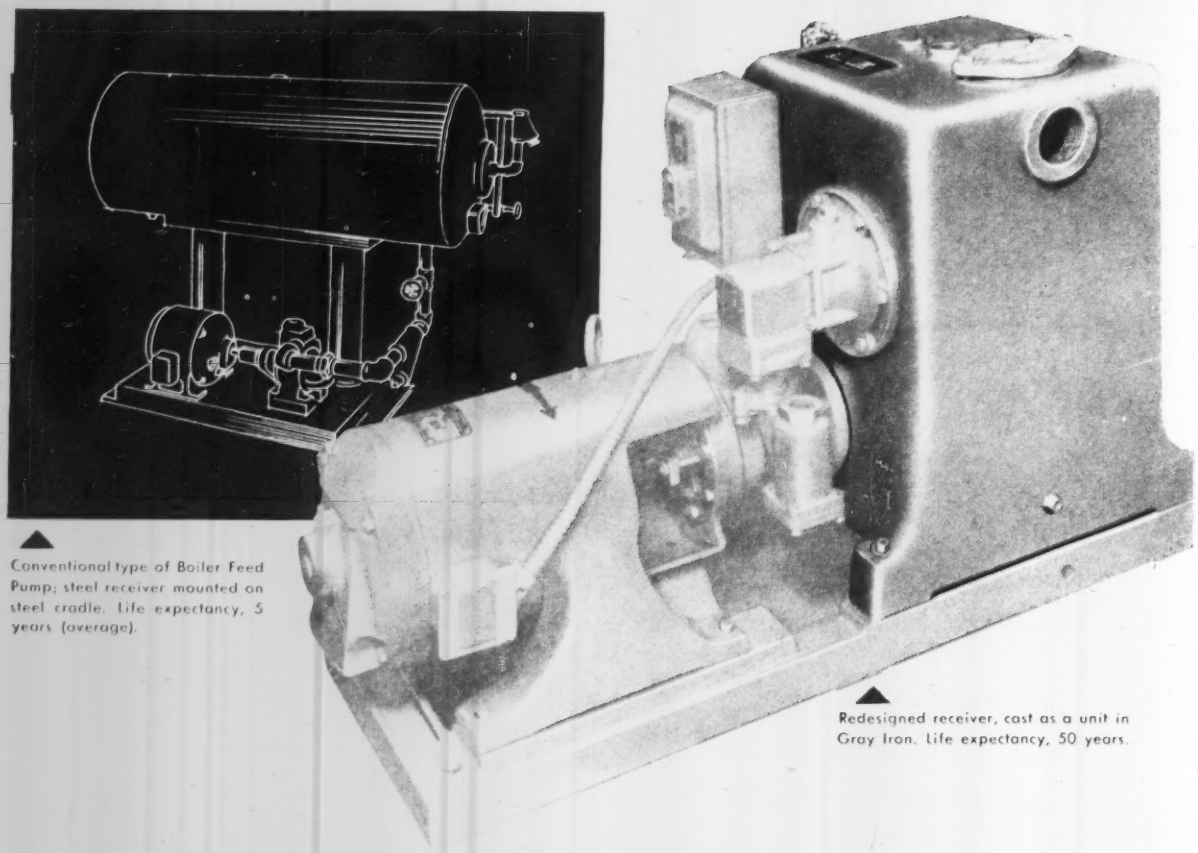
An article giving details of these installations, involving mills designed for rolling brass and copper strips in coils weighing up to 5000 lb. at a mill speed of 500-1000 ft. per min. was published in the Winter issue of our quarterly magazine, POWERFAX. Copies can be obtained from your nearest Elliott Company district office or write direct to Advertising Department, Elliott Company, Jeannette, Pa.

ELLIOTT Company

RIDGWAY DIVISION • CROCKER-WHEELER DIVISION



R3-4



Conventional type of Boiler Feed Pump; steel receiver mounted on steel cradle. Life expectancy, 5 years (average).

Redesigned receiver, cast as a unit in Gray Iron. Life expectancy, 50 years.

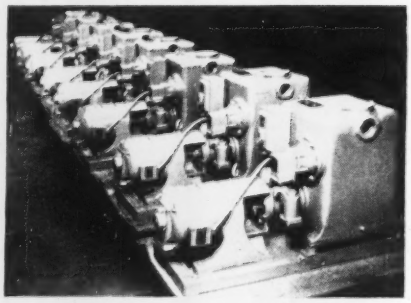
COST SAVINGS BUILT IN by practical use of GRAY IRON!

In Boiler Feed Pumps, first cost is less important than long-time economy. Because water conditions often cause certain materials to deteriorate rapidly, replacement costs are frequently high.

When a leading manufacturer replaced the conventional steel tank with a Gray Iron casting, here's what happened:

- In spite of somewhat higher initial cost, savings at the end of a 5-year period amounted to 38%—including replacement cost of steel tank, plus labor and fittings. This important saving in replacement cost will be realized every 5 years for approximately 50 years.
- By designing for the cast Gray Iron receiver and sub-base mounting, space requirements were reduced—excess piping, valves and fittings were eliminated.

Have you analyzed *your* product for possible cost savings which can be accomplished by designing for and with Gray Iron? Write for technical information on the many advantages of the Gray Iron casting process.



Boiler Feed Pumps with Gray Iron receivers, built for U. S. Navy.

Make it Better with Gray Iron . . .
Second largest industry in the metal-working field

GRAY IRON FOUNDERS' SOCIETY, INC.
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Let an experienced Whiting foundry engineer advise you regarding the charging system best suited to your requirements. He'll study your plant and yard layout. He'll consider the size of your foundry, size and number of cupolas, type of scrap used, coke ratio, coke quality, minimum and maximum hourly tonnages, molten metal temperature, and many other factors that influence the choice of charging methods.

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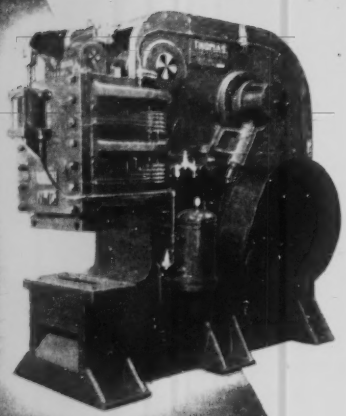
for top-production steel fabricating

1



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. . . the trend is to Thomas! Steel fabricators, shipyards, railroad car shops and steel mills look to Thomas for everyday dependability and ultimate economy in punching, spacing, shearing and bending machinery. Available in various sizes and tonnages to meet individual requirements. Illustrations show:

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(4) *Heavy-Duty Mill Type Plate Shear, capacity 1¼" by 6' stainless 120,000 psi*

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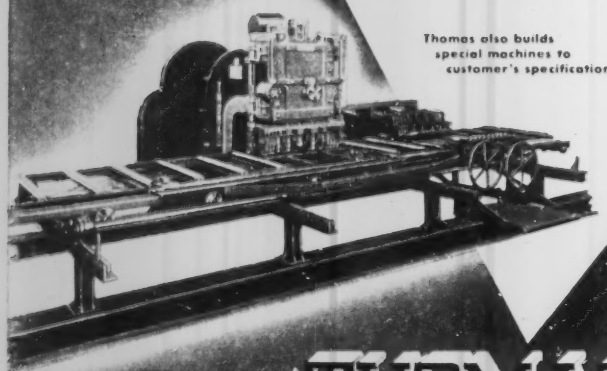

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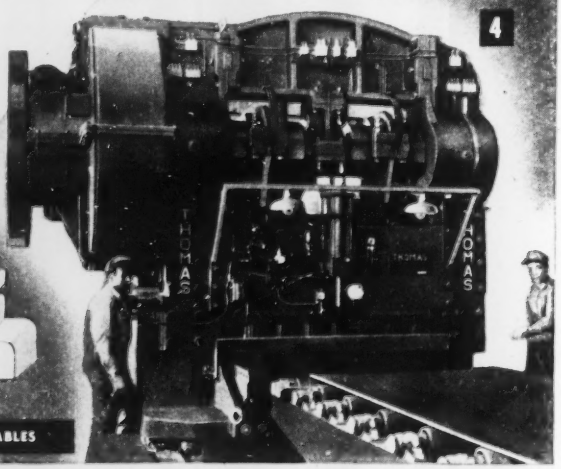

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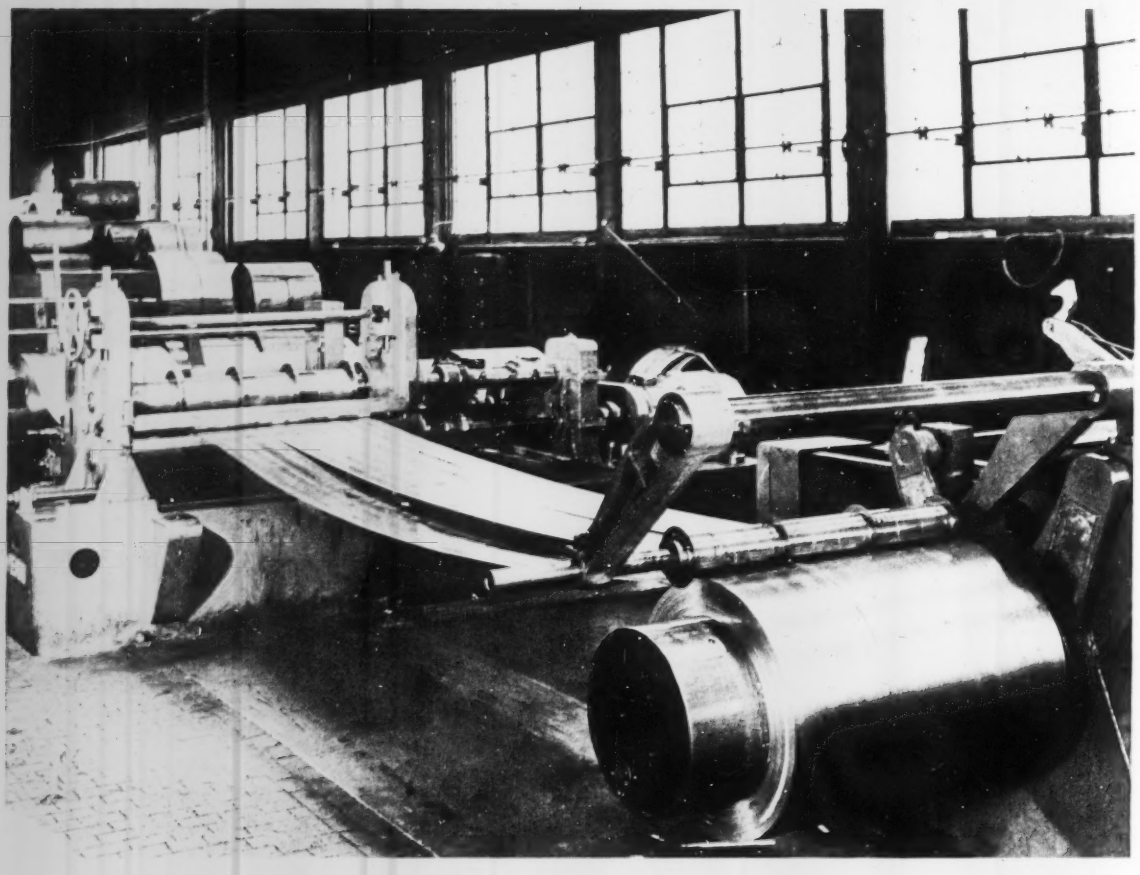

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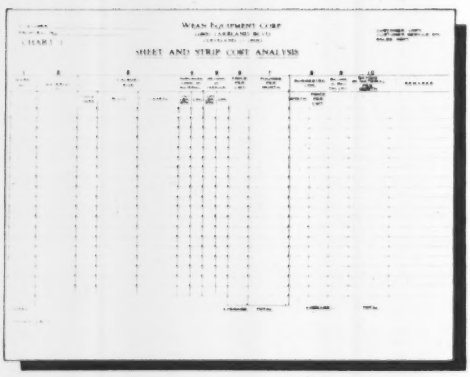
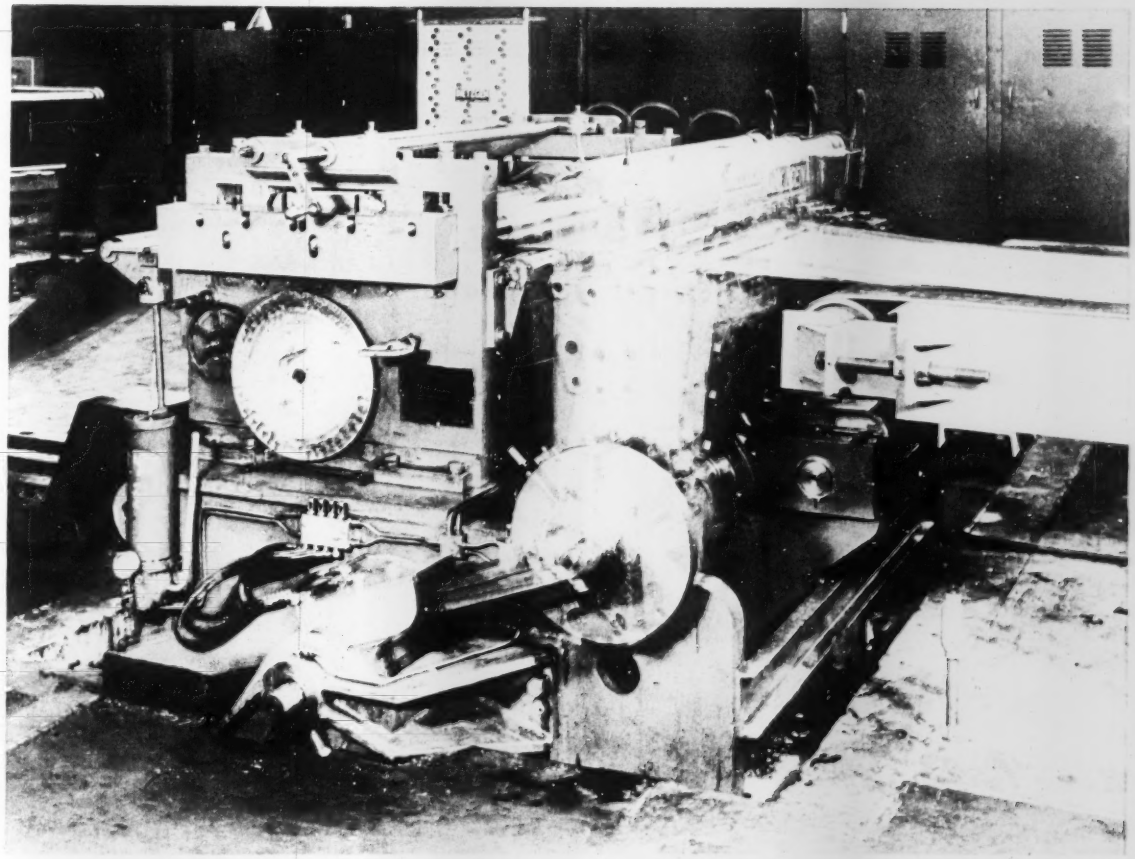
And

Here's A Simple Test That May Startle You

Want to save 20 percent on your steel costs? If you are using sheet steel in any great amounts a Wean Equipment engineer can quickly show you how the amazing new Wean Slitting and Flying Shear Line can effect this savings in your plant. Using your actual figures, Wean can, by a simple comparison method, quickly prove to you that these savings are possible. Why continue operating at high costs when this improved method could be saving you as much as $20 a ton on your steel?





Slitting and Flying Shear Line On Your Steel Costs

The secret of these tremendous savings is a short cut in getting steel from coil form to fabrication. If you are not one of those already using the Wean Slitting and Flying Shear Line you are either paying high mill extras for shearing to tolerance and size or are forced to do this operation expensively and slowly in your own plant or a costly combination of both.

The Wean Slitting and Flying Shear System eliminates this entire processing function by converting steel from coil to production size, at resquared tolerances, at a rate of 100 cuts per minute.

Just figure it out for yourself. Apply these figures to your own operation. Total up the extras you are now paying for steel preparation and you'll see why it will pay you to talk with Wean.

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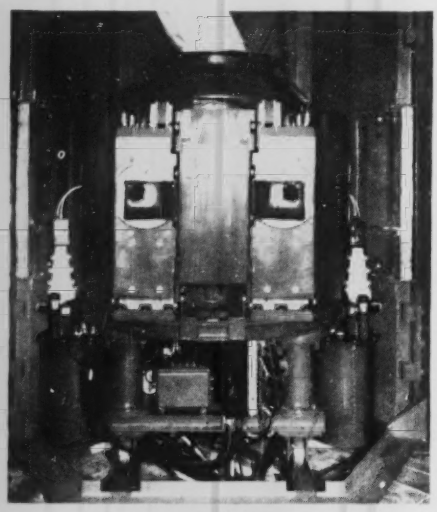

the world's most powerful stereoscopic

TWIN BEAM

31 million volt

BROWN BOVERI BETATRON

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- **Radiographic Inspection of metals up to 20″ thick.**
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Now it is possible to radiograph steel plates and similar objects up to 20 inches in thickness and detect the spacial location, form, size and direction of the flaw in a single picture with exposure time compatible with any production schedule. The powerful twin-beam Betatron not only achieves the stereoscopic effect but provides radiographs with far better contrasts than hitherto possible.

With the Brown Boveri Twin-Beam Betatron, radiography of welding seams is accomplished in half the time required by any other single-beam betatron. Its sensitivity is unprecedented. No side or back scatter on the radiograph. No masking of objects of varying thicknesses is required for pictures with greater contrasts.

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If yours is a production inspection, testing or research application where stereoscopic radiographs or exceptional picture definition are required, it will pay you to investigate the Brown Boveri Twin-Beam Betatron.

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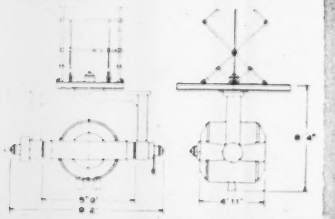
This compact, easy-to-operate unit requires no more overhead space than a conventional two million volt x-ray machine.



ideal for radiography of:

- High Pressure Boiler Welding Seams
- Tank Plates
- Heavy Castings
- Jet Engine Parts
- Shipbuilder's Plates
- Heavy Machinery

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BROWN BOVERI CORPORATION

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gun for lower welding costs!

Fast production of high quality welds in aluminum, bronze, copper, nickel, stainless steel and the other "hard-to-weld" materials . . . that's the money-saving secret of the Aircomatic® process!

Lower costs through speed . . . With Aircomatic, these advantages add up to a tidy time-saving on every joint: high deposition rate . . . lower weld metal requirements because of the improved joint designs made possible . . . *and* a sizeable reduction in the cleaning time provided by Aircomatic's "no-slag" characteristic.

Lower costs through quality . . . Welds made with Aircomatic are unmatched for strength, fusion, appearance and freedom from cracking and porosity . . . because Aircomatic controls penetration and dilution . . . because high current densities and concentrated heat reduce distortion to a minimum.

This inert-gas-shielded metal arc process can be used with manual guns like the 500-amp. Model 20 shown above, or automatic equipment. Upkeep and wire costs are low. Write today for the Aircomatic Catalog, and list of recently lowered wire prices.

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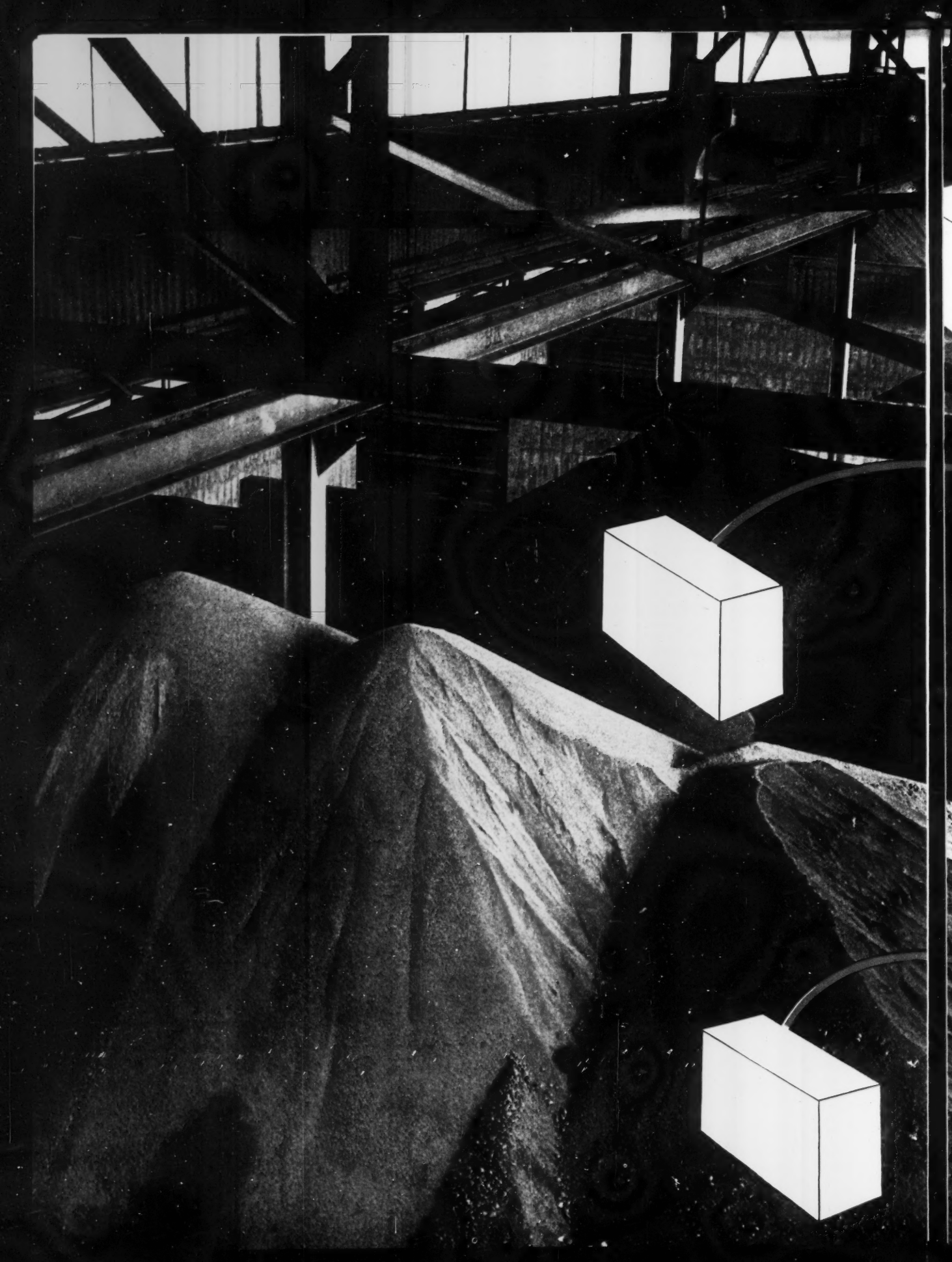

MOUNTAINS OF MAGNESITE

● From the hills of the west in Washington State, and the sea-water off the shores of New Jersey, comes magnesite, an essential raw material for many refractories.

These storage piles of magnesite grains at GREFCO's Baltimore Works await processing to become part of the manifold basic refractory products urgently required by America's metallurgical and other industries.

RITEX . . . STEELKLAD . . . most GREFCO burned basic brick . . . all contain substantial amounts of magnesite which gives them high refractoriness and slag resistance necessary for their use in open hearth furnace bottoms . . . front and back walls . . . end structures . . . roofs . . . in open hearth mixers and in their many other applications in the steel industry.

When the nation prospers and steel is on the move, you can see these mountains of magnesite dwindle and be replenished. At such times, for magnesite and all other refractories, GREFCO offers its far-flung facilities for raw materials production, its many manufacturing plants, and its hundreds of distributing agencies to insure a steady flow of dependable high quality refractories for all industry. If you have a furnace of any kind, call on GREFCO for a truly *complete refractories service.*

In Baltimore GREFCO maintains the world's most complete refractories research laboratories for experimental operations, and to analyze and control the high quality of its regular production.

When you count on GREFCO, you can be sure — because we make *sure!*

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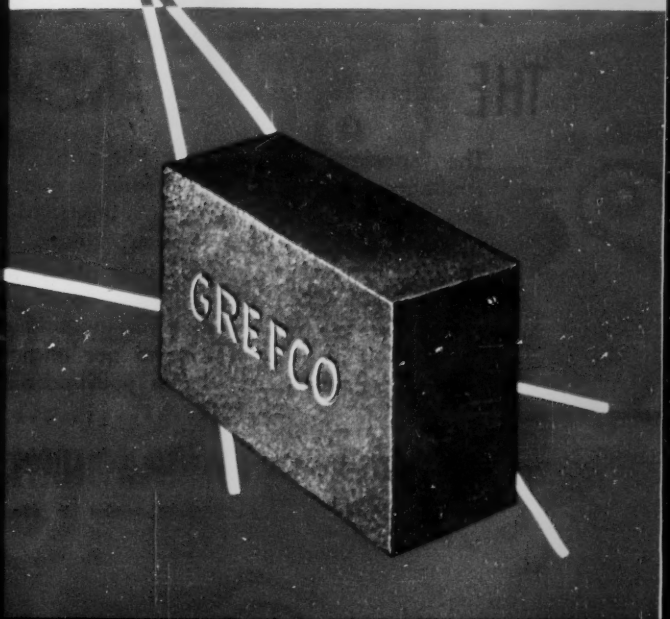

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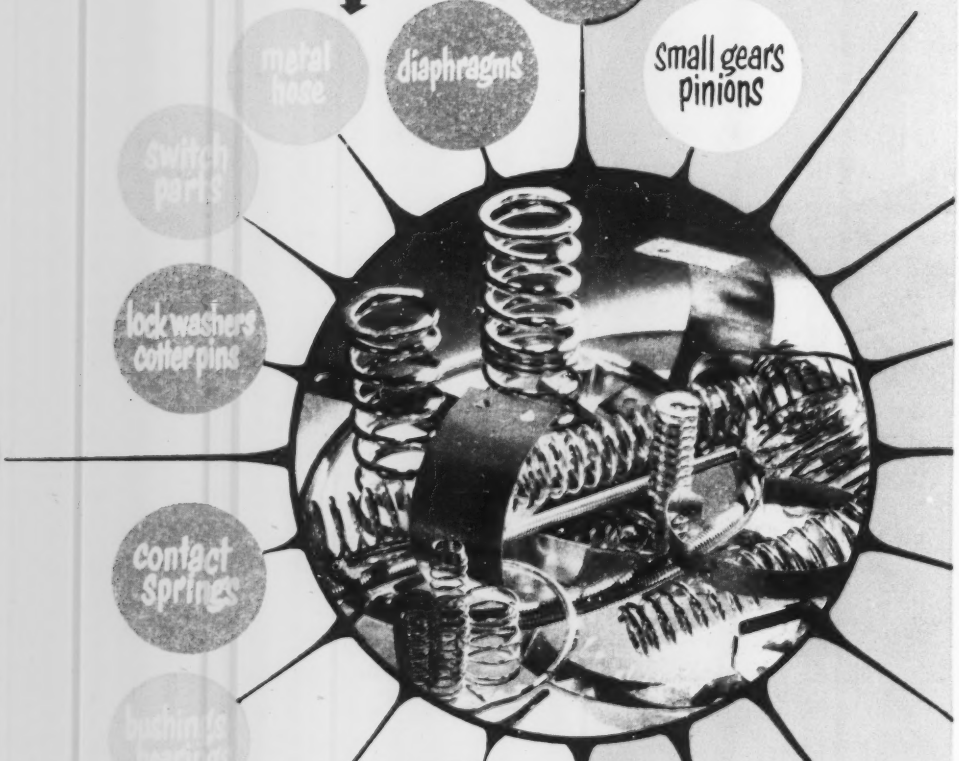

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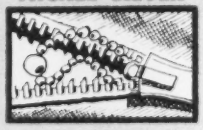

NICKEL ANODES

THE "SPECIALIST" AMONG ALLOYS!

The "specialty" of Seymour Phosphor Bronze — toughness, resiliency, and resistance to fatigue and corrosion — makes this wonder metal ideal for a thousand spring, electrical, and machined parts. Seymour's range of grades and tempers gives the designer a selection of qualities to fit the job.

Technical data are yours for the asking. Glad to furnish samples for tests, and our engineering department is ready to discuss your problem without obligation.

NONFERROUS ALLOYS SINCE 1878

THE SEYMOUR MANUFACTURING COMPANY **SEYMOUR, CONN.**

"top performers"

AETNA-STANDARD ENGINEERING CO.
ELLWOOD CITY, PA.

The Aetna - Standard Engineering Company say—"It is our opinion on radial drills that Cincinnati Bickford Super Service Radial Drills are top performers from the standpoint of service and handling ease".

Illustrations show the top carriage of gun carriage being drilled, tapped and reamed complete on this Cincinnati Bickford Super Service Radial—holes from $1\frac{1}{4}$" to $1\frac{1}{2}$", limits within .0005".

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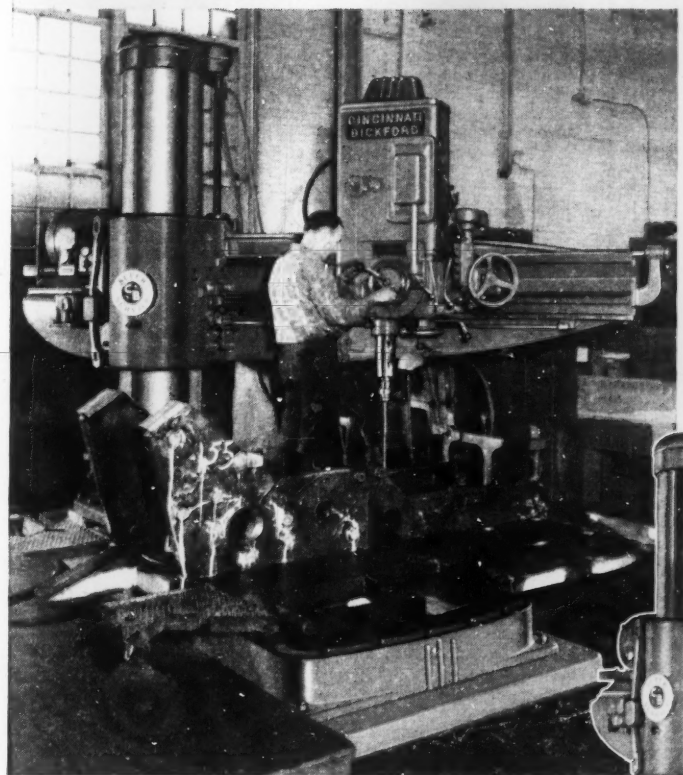

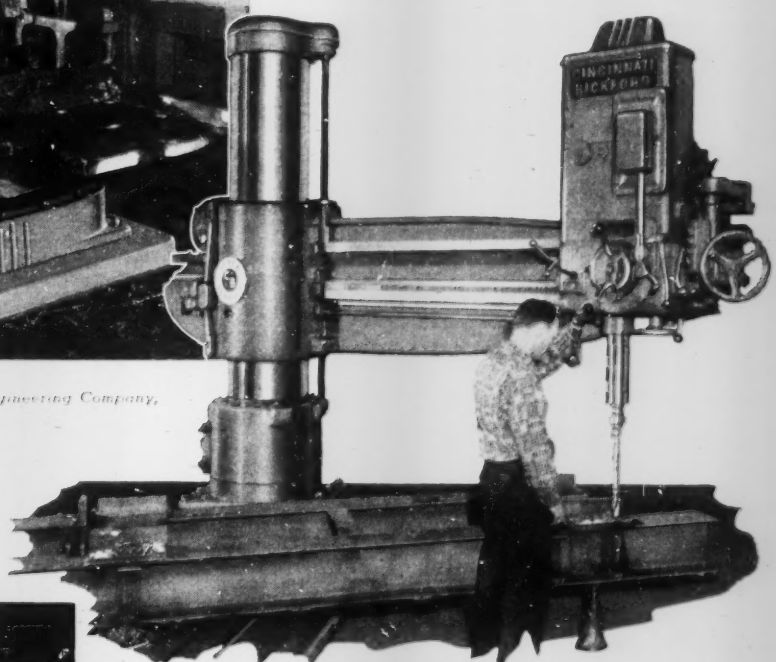

Photos courtesy of the Aetna Standard Engineering Company, Ellwood City, Pa.

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RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.
Cincinnati 9, Ohio, U.S.A.

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ELECTROMET Data Sheet

Published by Electro Metallurgical Company, A Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

ALLOYS FOR THE STEEL, IRON, AND NON-FERROUS INDUSTRIES

PRODUCT*	NOMINAL COMPOSITION	USES
BORON ALLOYS		
Ferroboron Min. 10.00% Boron Grade	Aluminum.....max. 0.50% Carbon.....max. 1.50%	Increases hardenability of steel; also, for additions to malleable iron and aluminum alloys.
Min. 17.50% Boron Grade	Aluminum....max. 0.50% Carbon.....max. 0.50%	
Manganese-Boron	Boron.....min. 17.50% Manganese...approx. 75% Carbon.....max. 3% Iron.....max. 5%	Used to cleanse and deoxidize non-ferrous alloys.
Nickel-Boron	Boron.....15 to 18% Carbon.....max. 0.50% Iron.....max. 3.00% Nickel.....Balance	Special boron alloy used principally for deoxidizing nickel and its alloys.
Boron Carbide	Boron.....42 to 48% Carbon.....45 to 52%	Deoxidizer for non-ferrous alloys.
Calcium Boride	Boron.....38 to 42% Calcium.....27 to 32% Carbon.....15 to 20%	Welding rod coating.
CALCIUM ALLOYS		
Calcium-Silicon	Calcium.....30 to 33% Silicon.....60 to 65% Iron.....1.50 to 3%	Deoxidizer for quality ingot steel. Also used in high-tensile gray irons.
Calcium-Manganese-Silicon	Calcium.....16 to 20% Manganese....14 to 18% Silicon.....53 to 59%	A complex deoxidizer used widely in production of steel castings.
Calcium Metal Regular Grade	Calcium.....98% Balance largely Calcium Chloride	Reducing agent in metallurgical applications, deoxidizer and degasifier for non-ferrous metals.
Distilled Grade	Calcium...approx. 99.50% Balance largely Magnesium	For special applications requiring calcium of very high purity.
CHROMIUM ALLOYS		
"Simplex" Low-Carbon Ferrochrome	Chromium.....63 to 66% Silicon.....5 to 7% Carbon.....max. 0.010% or 0.025%	For producing stainless steel, particularly the low-carbon grades. The silicon in the alloy reduces metal oxides from the slag back into the bath. Rapid solubility of the alloy saves furnace time.
2% Nitrogen-Bearing Grade	Chromium....62 to 65% Silicon.....5 to 7% Nitrogen.....2 to 2.5% Carbon.....max. 0.025%	
5% Nitrogen-Bearing Grade	Chromium....60 to 63% Silicon.....5 to 7% Nitrogen.....5 to 6% Carbon.....max. 0.025%	
Low-Carbon Ferrochrome (Other Grades)	Chromium.....67 to 71% Silicon.....0.30 to 1.00% Carbon (10 Grades) max. 0.03 to max. 2.00%	Production of stainless steels and high-temperature alloys requiring low carbon content.
High-Carbon Ferrochrome		
Max. 4.50, 5.00, or 6.00% Carbon Grade	Chromium.....67 to 70% Silicon.....1 to 2%	For production of engineering alloy steels and other alloy steels of moderate chromium content.
Max. 7.00% Carbon Grade	Chromium.....66 to 69% Silicon.....1 to 3%	
Min. 7.00% Carbon Grade	Chromium.....65 to 68% Silicon.....1 to 3%	
Nitrogen-Bearing Low-Carbon Ferrochrome	Chromium.....67 to 71% Silicon.....0.30 to 1.00% Carbon.....max. 0.10% Nitrogen....0.75 to 2.00%	For additions of nitrogen to improve properties of high-chromium steels.
"SM" Ferrochrome	Chromium.....60 to 65% Silicon.....4 to 6% Carbon.....4 to 6% Manganese.....4 to 6%	A high-solubility chromium addition for steel or iron in either furnace or ladle.

PRODUCT*	NOMINAL COMPOSITION	USES
CHROMIUM ALLOYS cont.		
Exothermic Ferrochrome **Exothermic Silicon-Chrome**	Chromium....60% approx. Carbon.....4.5% max. Chromium...46% approx. Silicon.....23% approx. Carbon.....1.00% max.	These improved exothermic ladle alloys have high solubility, low carbon pickup, and high ignition temperature.
Foundry Ferrochrome High-Carbon Grade	Chromium.....62 to 66% Silicon.....7 to 10% Carbon.....5 to 7%	Developed especially for high-solubility ladle additions of chromium to improve composition and properties of cast iron.
Low-Carbon Grade	Chromium.....50 to 54% Silicon.....28 to 32% Carbon.....max. 1.25%	
Chromium Metal Low-Carbon Grades	Chromium.....min. 97% Carbon.....max. 0.10% and 0.50% Iron.....max. 1%	Production of wide variety of non-ferrous chromium-bearing alloys, including electrical resistance alloys and high-temperature alloys.
High-Carbon Grade	Chromium.....87 to 90% Carbon.....9 to 11% Iron.....max. 1.25%	
Electrolytic	Chromium.....min. 99%	
"EM" Ferrochrome-Silicon No. 1 Grade	Chromium.....39 to 41% Silicon.....42 to 46% Carbon.....max. 0.05%	Used in production of stainless steel to reduce metal oxides from the slag back into bath.
No. 2 Grade	Chromium.....36 to 39% Silicon.....36 to 39% Aluminum.....7 to 9% Carbon.....max. 0.05%	
"EM" Ferrosilicon-Chrome	Chromium.....50 to 54% Silicon.....28 to 32% Carbon.....max. 1.25%	For adding chromium and silicon to steels containing up to 1 or 2 per cent chromium.
"EM" Chromium Briquets (Hexagonal Shape)	Chromium.....2 lb. Total Weight.....3 1/8 lb.	For adding chromium to cast iron in the cupola.
COLUMBIUM ALLOYS		
Ferrocolumbium	Columbium.....50 to 60% Silicon.....max. 8% Carbon.....max. 0.40%	Stabilizer in austenitic chromium-nickel stainless steels. Also constituent of high-temperature alloys.
Ferrotantalum-Columbium	Columbium...approx. 40% Tantalum.....approx. 20% Cb + Ta.....min. 60% Silicon.....5 to 7% Carbon.....max. 0.30%	Stabilizer used to supplement ferrocolumbium in chromium-nickel stainless steels. Also used in high-temperature alloys.
MANGANESE ALLOYS		
Standard Ferromanganese Regular Grade	Manganese.....74 to 76% Carbon.....approx. 7% Silicon.....max. 1%	Most common means of adding manganese to steel for both alloying and deoxidizing purposes. Also for counteracting sulphur in steel and cast iron.
Low-Phosphorus Grade	Manganese.....78 to 80% Carbon.....max. 7% Silicon.....max. 2% Phosphorus...max. 0.10%	
Low-Carbon Ferromanganese Low-Phosphorus Grade	Manganese.....min. 90% Carbon.....max. 0.07% Phosphorus...max. 0.06%	Additions of manganese to steels of low-carbon specification, particularly stainless steels of 18 per cent chromium, 8 per cent nickel type.
Regular Grades	Manganese.....85 to 90% Carbon...max 0.07, 0.10, 0.15 0.30, or 0.50%	
Regular Grade (High-Silicon)	Manganese.....80 to 85% Carbon.....max. 0.75% Silicon.....5 to 7%	

*All of the alloys and metals listed are produced in the usual lump, crushed, or ground sizes, except where other special forms are indicated.

PRODUCT*	NOMINAL COMPOSITION	USES
MANGANESE ALLOYS cont.		
"Mansiloy" Alloy	Manganese....60 to 63% Silicon.....28 to 31% Carbon.....max. 0.07% Phosphorus....max. 0.05%	Used in production of stainless steels to reduce metal oxides from the slag back into the bath.
Silicomanganese		
Max. 1.50% Carbon Grade	Manganese....65 to 68% Silicon.....18 to 20%	A versatile alloy useful as furnace block, deoxidizer, and also for making manganese additions to steel in the ladle or in the furnace.
Max. 2.00% Carbon Grade	Manganese....65 to 68% Silicon.....15 to 17.50%	
Max. 3.00% Carbon Grade	Manganese....65 to 68% Silicon.....12 to 14.50%	
Medium-Carbon Ferromanganese	Manganese....80 to 85% Carbon.....max. 1.25 to 1.50%	For making low- and medium-carbon manganese steel and Hadfield steel.
Low-Iron Ferromanganese	Manganese....85 to 90% Carbon.....approx. 7.00% Silicon.....max. 3% Iron.....max. 2%	For high manganese additions to certain non-ferrous alloys, particularly aluminum.
Manganese Metal	Manganese...min. 95.50% Carbon.....max. 0.20% Silicon.....max. 1.00% Iron.....max. 2.50%	Used both as deoxidizer and alloy in production of numerous non-ferrous metals and alloys.
"EM" Silico-manganese Briquets (Square Shape)	Manganese.....2 lb. Silicon.....½ lb. Total Weight.....3½ lb.	For adding manganese (with silicon) to cast iron in the cupola.
"EM" Ferro-manganese Briquets (Oblong Shape)	Manganese.....2 lb. Total Weight.....3 lb.	For adding manganese (without silicon) to cast iron in the cupola.
SILICON ALLOYS		
50% Ferrosilicon		
Regular Grade	Silicon.....47 to 51%	Deoxidizer for most grades of killed or semi-killed steel. Blocking grade specially sized for maximum efficiency.
Blocking Grade	Silicon.....47 to 51%	
Low-Aluminum Grade	Silicon.....47 to 51% Aluminum....max. 0.40%	
65% Ferrosilicon		
Regular Grade	Silicon.....65 to 70%	For furnace or ladle addition to steels.
Low-Impurity Grade	Silicon....61.50 to 66.50% Aluminum....max. 0.50% Total Impurities max. 1.00%	Mainly for production of electrical sheet steel.
75% Ferrosilicon		
Regular Grade	Silicon.....73 to 78%	Deoxidizer and alloy for production of high-silicon spring and electrical sheet steel. Graphitizing inoculant for cast iron.
Low-Aluminum Grade	Silicon.....73 to 78% Aluminum....max. 0.50%	
85% Ferrosilicon		
Regular Grade	Silicon.....83 to 88%	Enables melter to add higher percentages of silicon without chilling metal in ladle. Graphitizing inoculant for cast iron.
Low-Aluminum Grade	Silicon.....83 to 88% Aluminum....max. 0.50%	
90% Ferrosilicon		
Regular Grade	Silicon.....92 to 95%	Permits large additions of silicon without harmful chilling effect.
Low-Aluminum Grade	Silicon.....92 to 95% Aluminum....max. 0.50%	
Silicon Metal		Additions of silicon to non-ferrous metals, particularly aluminum and copper.
Regular Grade	Silicon....min. 97 or 96% Iron.....max. 1 or 2%	
Purified Grade	Silicon....99.70 to 99.90% Iron.....005 to .015%	For applications in non-ferrous industry requiring silicon of high purity.
Low-Calcium Grade	Silicon.....min. 97% Iron.....max. 1% Calcium.....max. 0.10%	For high-silicon aluminum alloys where calcium is detrimental.
Low-Aluminum Grade	Silicon.....min. 98% Iron.....max. 1% Aluminum....max. 0.10%	For the production of silicon-copper alloys where aluminum is detrimental.
"SMZ" Alloy	Silicon.....60 to 65% Manganese.....5 to 7% Zirconium.....5 to 7%	Particularly strong graphitizing inoculant used in cast iron.
"EM" Silicon Briquets		
Large Size (Cylindrical or Brick-Shape	Silicon.....2 lb. Total Weight.....5 lb.	For adding silicon to cast iron in the cupola. (Brick-shape briquets are available on pallets.)
Small Size (Cylindrical Shape)	Silicon.....1 lb. Total Weight.....2½ lb.	

"Electromet," "EM," "Mansiloy," "Simplex," "SM," and "SMZ," are trade-marks of Union Carbide and Carbon Corporation.

PRODUCT*	NOMINAL COMPOSITION	USES
SILICON ALLOYS cont.		
Magnesium-Ferrosilicon	Silicon.....43 to 47% Magnesium....7.5 to 9.5%	For ladle addition to cast iron to obtain special properties.
TITANIUM ALLOYS		
Ferrotitanium	Titanium.....27 to 32% Carbon.....max. 0.10%	For stabilized austenitic stainless steels and high-temperature metals.
Silicon-Titanium	Titanium.....40 to 50% Silicon.....45 to 50% Iron.....max. 3%	For additions of titanium to steels or non-ferrous alloys.
Manganese-Nickel-Titanium	Titanium.....43 to 48% Nickel.....approx. 25% Manganese.....max. 8%	Deoxidization of nickel alloys.
TUNGSTEN ALLOYS		
Ferrotungsten	Conforming to A.S.T.M. Spec. A 144-50	For production of tool and die steels; also high-temperature alloys.
Tungsten Metal Powder		
Melting Grade	Tungsten....min. 98.80% Total Carbon..max. 0.25%	Production of tungsten steels and cast tungsten carbide.
Premium Grade	Tungsten....min. 99.60% Carbon.....max. 0.20%	
Calcium Tungstate	Tungstic Oxide..68 to 72%	For making tungsten chemicals and other tungsten products.
Calcium Tungstate Nuggets	Tungstic Oxide..68 to 72%	Making tool steels and high-temperature alloys.
Ammonium Paratungstate	Tungstic Oxide..min. 88.2%	Intermediate for tungsten products
VANADIUM ALLOYS		
Ferrovanadium	Vanadium.....50 to 55% Carbon....max. 0.20, 0.50, or 3.00% Silicon....max. 1.50, 2.00, or 8%, and approx. 10%	Production of tool and engineering steels, high-strength structural steels, non-aging rimming steels, and wear-resistant irons.
Vanadium Oxide Fused	V_2O_5.....86 to 89% Na_2O.....approx. 10% CaO.....approx. 2%	For addition of vanadium to steel and for manufacturing catalysts.
Sodium Polyvanadate (Red Cake)	V_2O_5.....approx. 85% Na_2O.....approx. 9%	For manufacture of vanadium compounds, including vanadium catalysts.
High-Purity Ammonium Metavanadate	V_2O_5.....approx. 99.50% NH_4VO_3.....min. 99%	
ZIRCONIUM ALLOYS		
12 to 15% Zirconium Alloy	Zirconium.....12 to 15% Silicon.....39 to 43% Carbon.....max. 0.20%	This is a powerful deoxidizer. It also increases depth of hardening.
35 to 40% Zirconium Alloy	Zirconium.....35 to 40% Silicon.....47 to 52% Carbon.....max. 0.50%	Deoxidizer for fine grades of alloy steels.
Nickel-Zirconium	Zirconium.....25 to 30% Nickel.....40 to 50%	For deoxidizing and degasifying nickel alloys.
"EM" Zirconium Briquets (Cylindrical Shape, Reddish Color)	Zirconium.....0.55 lb. Silicon.....1.90 lb.	For adding zirconium and silicon to cast iron in the cupola.

IF YOU HAVE A METALS PROBLEM

More than 50 different alloys and metals are produced by ELECTROMET. If you need help in selecting the proper alloys, be sure to consult one of ELECTROMET'S specially trained metallurgists and engineers. Address your inquiries to one of the offices listed below.

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clean, accurate threads run on quickly, smoothly

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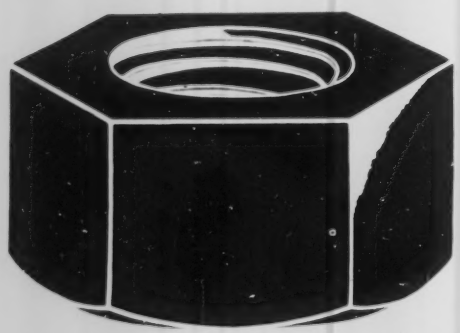
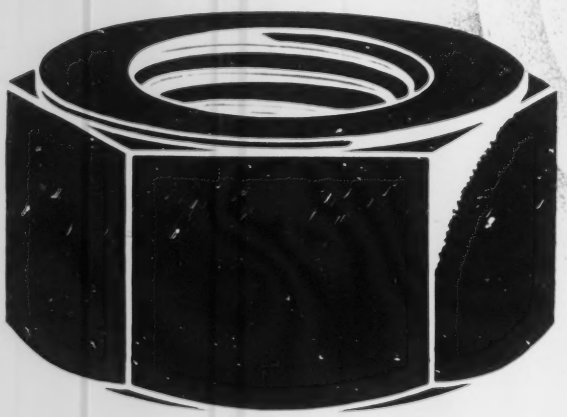
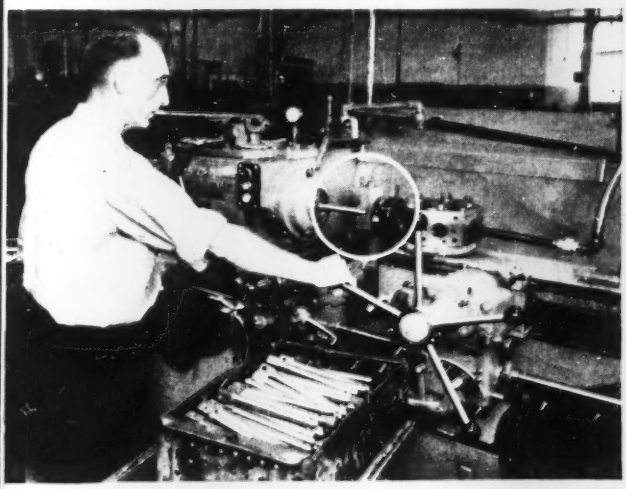




WHY THIS NEW SELF-OPENING HEAD

Rolls threads more accurately · stronger · smoother... and cheaper than any other tool



¼" Self-Opening head rolling piece shown on a hand operated turret lathe.

This "Fette" patent chipless thread forming method is *different*—material rolled flows in an axial direction so that the thread is generated ahead of the rolls. Flow to full depth of thread avoids broken grain structure and cratering crest; surfaces are densified, smoother, more wear resistant. Part shown is unretouched.

It works like this—annular grooved rolls are positioned in plates in the head and only the rolls are changed for different thread forms or pitches. Fine adjustment is provided for exacting diameters. Rolling speeds are equivalent to turning speeds.

Self-opening heads, with simple quick-acting gear mechanism, frees the work instantly at proper thread length; no lead screw or follow up cam required.

These National Acme (Fette patent) Heads accommodate all standard parallel thread forms and are made in both revolving and non-revolving types suited to horizontal and vertical machines.

Bulletin FRH-53 gives full data

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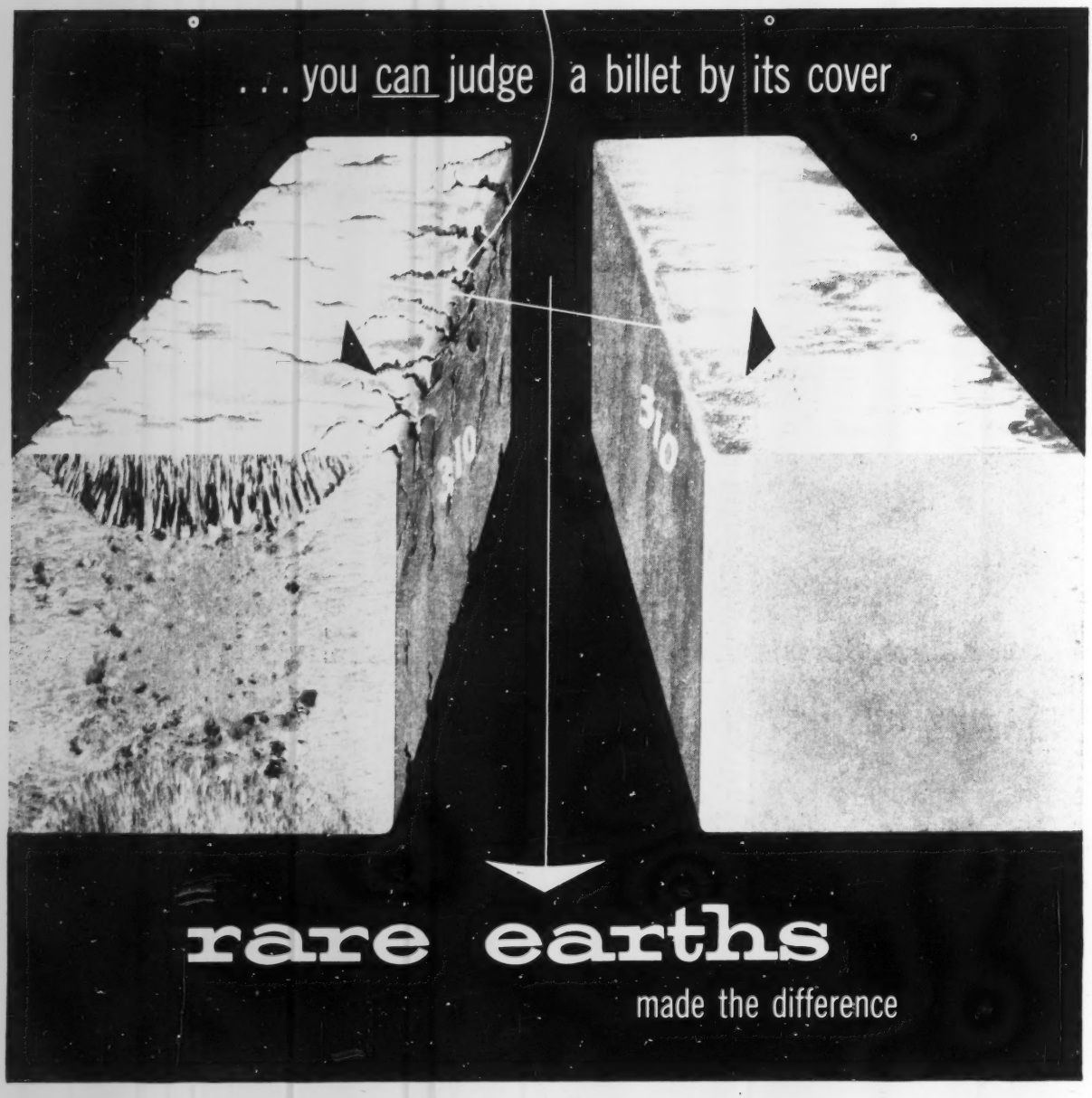

The two billets shown were produced by a prominent manufacturer of 310 stainless steel. Before rare earth additions, the billet on the left shows a coarse columnar structure, with frequent corner cracks. Heavy cogging was necessary to permit rolling with a minimum of hot tearing; after rolling a grinding loss from the edges incurred additional production time and expense.

Consider the billet on the right, and the great improvement made by a small economical addition of **MCA RareMeT Compound.** The fine primary crystal pattern shown in the sectional view is taken from an unretouched, unmagnified photograph. This steel was rolled without intermittent heating cycles from ingot to billet, and frequently to final size, all with a minimum of hot tearing.

Write today for free Progress Report Number 1, "Rare Earths in Melting." just off the press!

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Don't be handicapped by relying on a supplier with a limited line to answer all your needs. It may cost you more . . . may handicap the expected performance of your machines.

Your Chain Belt Field Sales Engineer will be happy to assist you in making the exact chain selection that best fits your requirements. He is not prejudiced by the limitations inherent in an incomplete chain line . . . can recommend the chain that will give you the service you want . . . at the lowest possible cost. For complete information or engineering assistance, mail the coupon.

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ANNOUNCING the new BRYANT

BRYANT proudly introduces the newest member of the Bryant family of precision machines — the Bryant 998 Boring Machine — a production machine for precision boring, drilling, turning, facing, grooving and contour turning and boring where fine finish and rapid production are desired.

The Bryant 998 can be tooled either as a single purpose machine for quantity production or for miscellaneous work on small lots. Because it is all-mechanical, its cycle is positive and constant.

Smooth, uniform motion of the table and freedom from vibration, so essential to generating a fine finish with a single point tool, are assured by the 998. Its bed, bridge, heads and table are Meehanite castings. The table moves on preloaded ball bearing slide bars and is mechanically actuated by a simple cam and lever unit. Cam and change gears are easily accessible for changing either the length of stroke or the rate of travel. The motors for driving the cam and the boring heads are mounted in an accessible cavity inside the bed, thus keeping floor space to a minimum. This cavity is fan ventilated.

Ample fixture mounting surface is provided by the table, which measures $17\frac{1}{2}''$ x $22''$. The table has three $\frac{1}{2}''$ T-slots, and will accommodate a wide variety of fixtures. Machined setup pads are provided on the bridge for ease in locating fixtures.

The design of the Bryant 998 takes full advantage of standard purchased parts. Brakes, motors, air cylinder, bearings, pneumatic follower system, lubrication hoses and all electrical apparatus are stock items. Either low or high pressure coolant systems are available. All electrical equipment conforms to J. I. C. standards.

BORING MACHINE

Design

- The bed, bridge, table and heads are normalized Meehanite castings.
- The cam actuated table moves on preloaded ball slide bars.
- The cam is hardened and ground.
- The boring head spindles rotate in preloaded super-precision ball bearings. A graduated spindle nose and eccentric bushing for tool setting are standard.
- An air cylinder opposes the work table motion directly with constant pressure and keeps the cam follower roll and the cam always in contact.
- The boring head drive is completely accessible and is designed for long life.
- The cam drive assembly is protected by a torque limiting clutch.
- Cycle time is controlled by precision change gears in the cam drive gear box.
- An ample pad is provided at the rear of the machine for mounting accessory equipment.

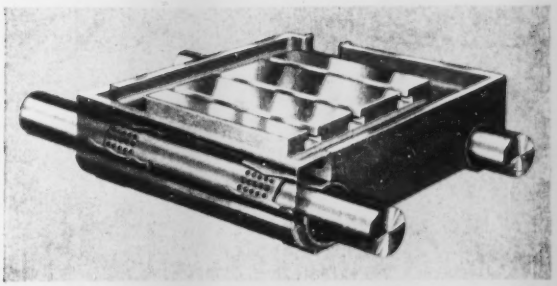
Operation

- Push button controls are conveniently located on a panel at the front of the machine.
- Cycle can be manual, semi-automatic or fully automatic.
- An emergency stop button will instantaneously interrupt the cycle.
- Jog buttons are located on both the front and the rear of the machine for setup purposes.
- Machined setup pads are provided on the bridge for ease in locating fixtures.

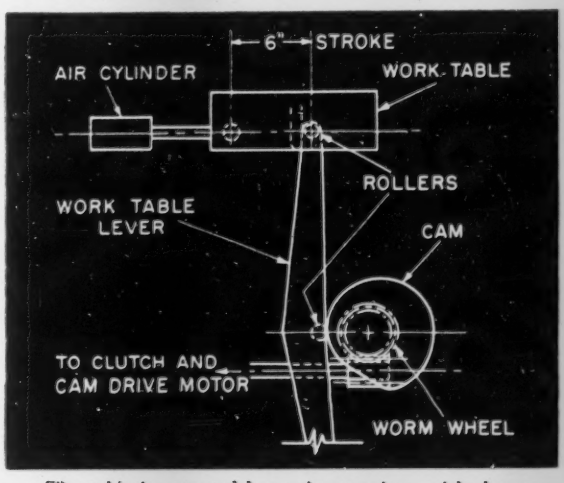
Maintenance

- Maintenance is necessary at only three points: two grease fittings on the cam follower assembly and cleaning and lubricating of the filter-lubricator unit in the pneumatic system.
- The ball slide table is grease sealed.
- Gear box has its own closed lubrication system.
- The boring head bearings are permanently grease sealed.
- The cam is easily accessible for changing the table stroke. It is taper mounted and keyed to the drive shaft to ensure ease of changing and accurate mounting.
- The change gears are enclosed in their own wet sump, splash lubrication system.
- Brakes, motors, air cylinder, bearings, pneumatic follower system, lubrication hoses and all electrical apparatus are standard purchased parts.

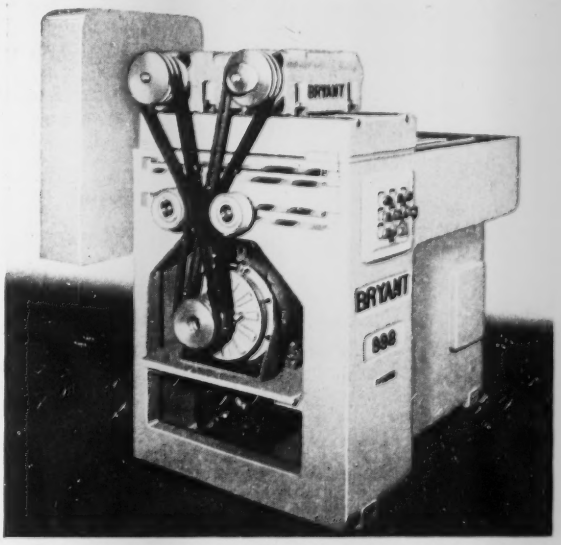
Write today for complete information and specifications!



Smooth response of the table is ensured by the special Bryant slide bar design. Each bearing is a hardened steel sleeve containing numerous 3/8" diameter preloaded balls. This provides a metal-to-metal contact which resists forces in all directions and transmits stresses directly to the bed.



The table is actuated by an inexpensive, quick-change cam working through a follower and lever arm. An air cylinder opposes the work table motion, keeping the cam follower and the cam always in contact to completely eliminate back-lash and jump.



Cam drive and boring head motors are mounted in a well ventilated cavity in the bed.

BRYANT Chucking Grinder Company
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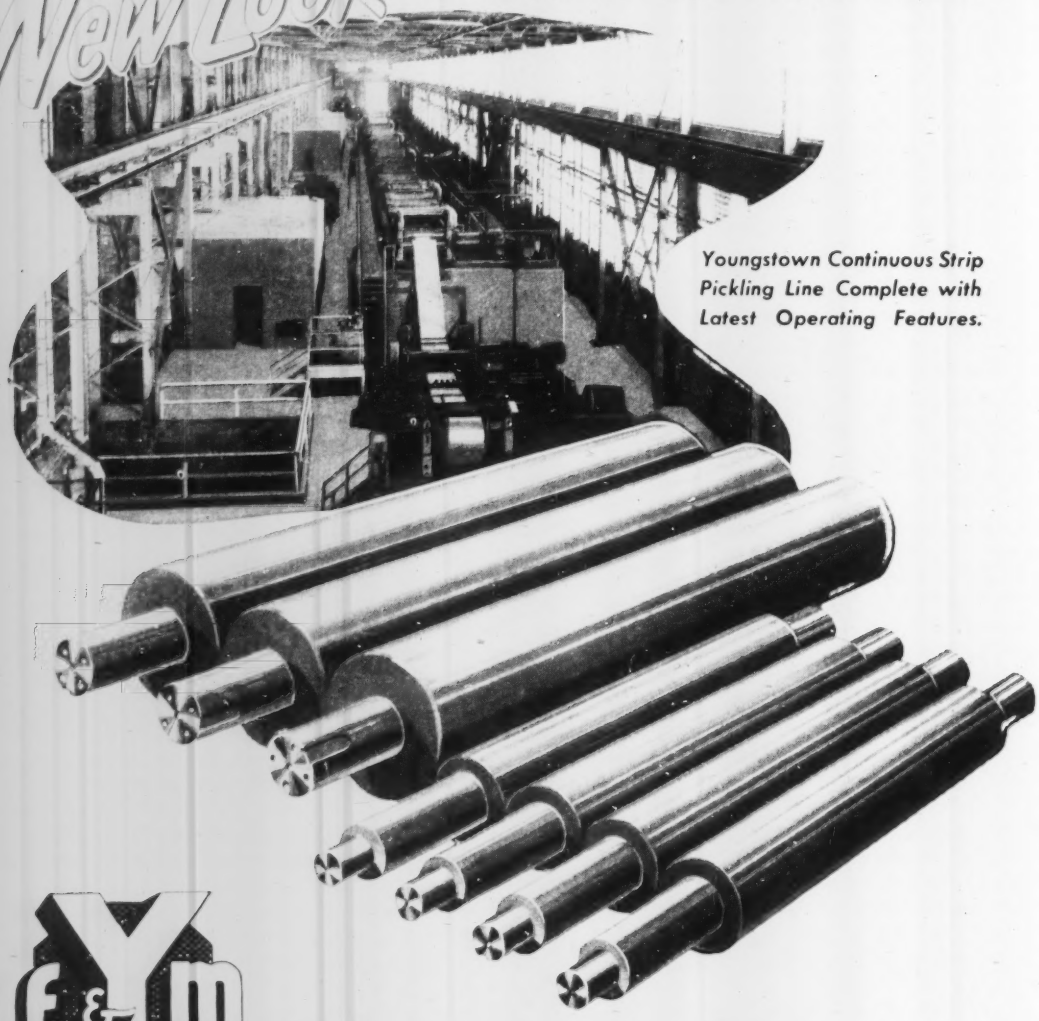

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13

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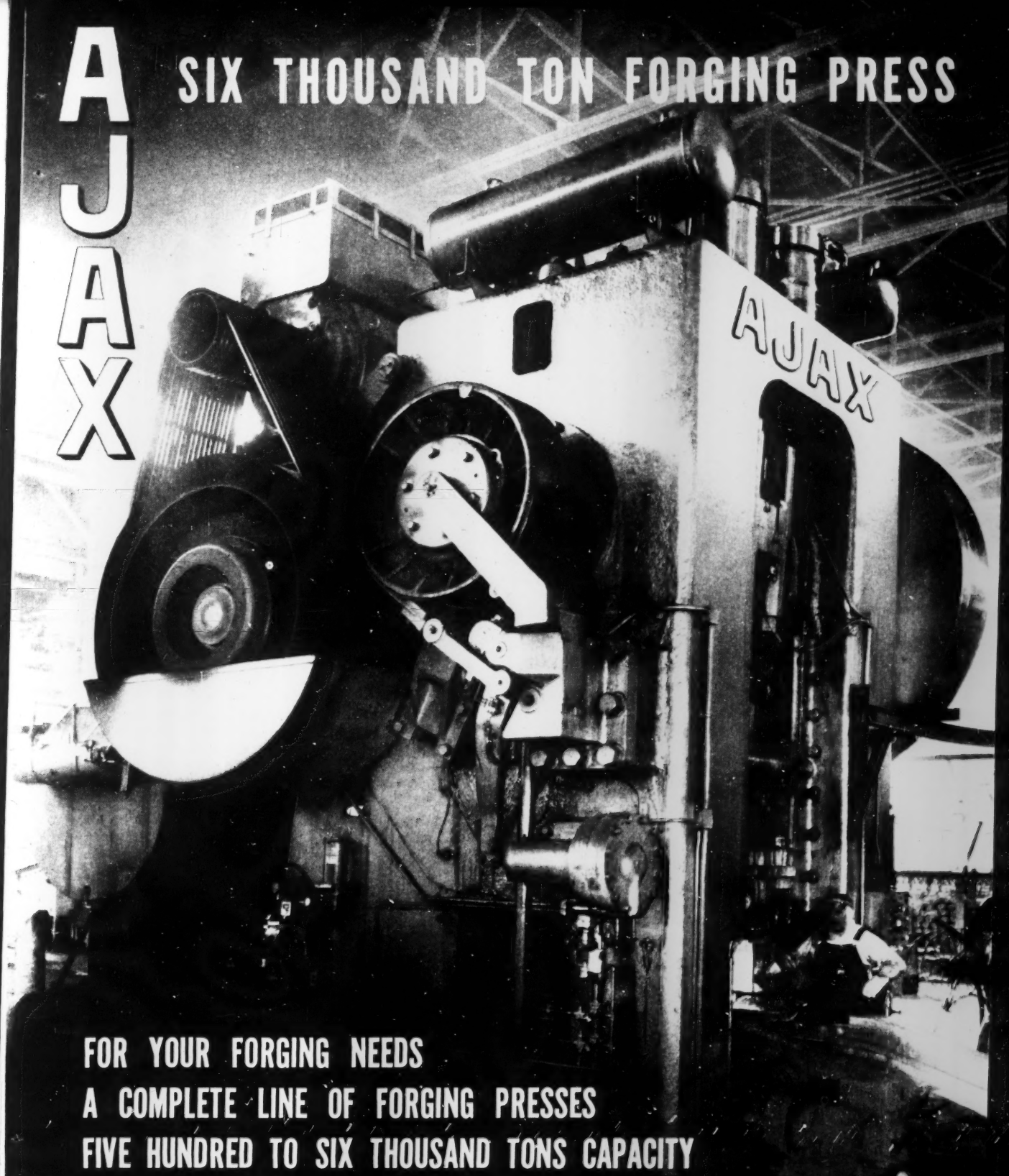

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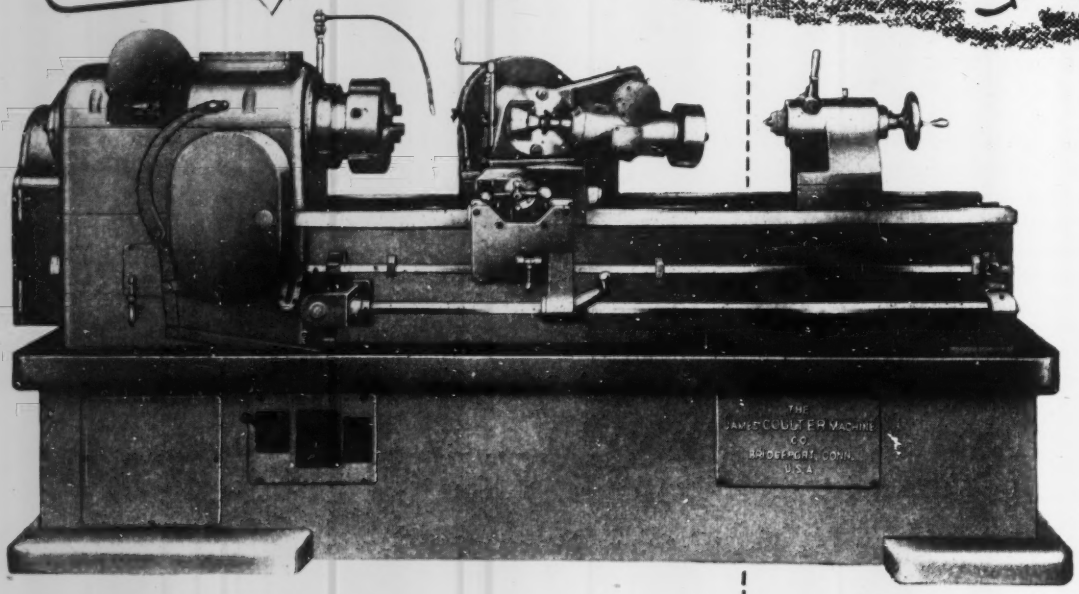

Get set to sing a happy tune, for COULTER can help you banish those *"labor shortage/reject/poor production of threaded part/blues"*.

The COULTER "Threadmaster" (shown above) is one thread milling machine that can produce long and short precision traversing, elevating, crossfeed and lead screws in less time with uncanny accuracy.

Investigate COULTER AUTOMATIC THREADING MACHINES today — change the "blues" to "cheers" — extract *every cent of profit* possible out of your plant and still maintain the high quality standards you demand.

IF YOU ARE CONFRONTED with a thread production problem, our engineers can help you. Literature available.

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The James Coulter Machine Co.

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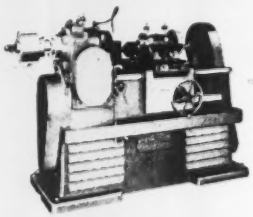
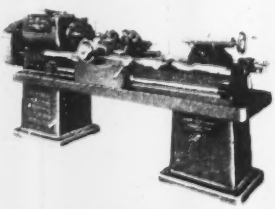


Model "H1" COULTER HOB THREADING MACHINE produces internal, external, right and left hand threads with precision — Faster — Accurately — AUTOMATICALLY.



Model "L1" COULTER THREADING LATHE produces precision, square, standard and 29 degree internal or external threads in various diameters and materials — Faster — Accurately — AUTOMATICALLY.

ANACONDA FORUM
for the Electrical Industry

MODERNIZATION AND ELECTRIFICATION— A LOOK AHEAD

by: Maxwell Cole
Manager Market Studies and Service Division
Philadelphia Electric Company
Philadelphia, Pa.

AMERICAN industry, its vision of new products for better living, its ingenuity in developing new methods and materials to make them, and its courage to invest in the facilities to produce them is the cornerstone on which American living standards have been erected. To make more things, faster, better and cheaper so that they may be available to more and more people has been the goal of American industry. Its success in reaching toward that goal has been its outstanding accomplishment.

REPLACING MANPOWER WITH HORSEPOWER

Operating in a free competitive economy, at liberty to develop new products and better ways of making them, American industry has taken full advantage of the opportunities offered by modern, high speed tools powered by electricity to increase its productive capacity, to improve its product and to reduce costs by replacing manpower with horsepower. Refrigerators and washing machines, automobiles and jet-propelled planes, plastics and stainless steel and many other of today's conveniences, even necessities, would not be available in sufficient quantity or at low enough prices to have become accepted elements of American life but for the readiness of industry to accept new products and new methods and to modernize their facilities to accommodate them. Industry's readiness to streamline production methods and modernize facilities enabled us to snow our enemies of World War II under an avalanche of production.

NEW CHALLENGES

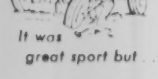
Today, industry faces new challenges. It must produce materials of war in such quantity and of such quality that no enemy dare attack us; it must maintain progress in fields of civilian production; and many people believe we are entering an era of keener competition than experienced for many years. Industry's ability to meet these challenges depends on its willingness to continue to modernize facilities and keep abreast of progress.

CONTINUED MODERNIZATION LIES AHEAD

We stand only on the threshold of the promises science and industry hold out for our future strides into security and better living. These promises will become realities only as better, more powerful tools are developed for producing them and as industry maintains its courage in investing in them to continue our national progress and replace wasteful or obsolete methods. Contemplating such a vista of promises, with faith that American industry still possesses characteristics which raised it to its present level of greatness, one foresees continued modernization of American factories, processes and products at a pace even greater than it has been in the past.

AMERICA'S CHALLENGE to industry is to meet and sustain an increasingly higher level of production in the face of keen competition. New and better equipment—such as this installation of a 75,000-pound chain drawbench in a Connecticut Mill—is a vital part of expansion and modernization. With each new machine comes the need for increased power and modern wire and cable!

A LOOK AT MODERN



It was great sport but . . .

EVER SEE A STUTZ "BEARCAT" on the road these days? With loving care and a knack for tinkering, hobbyists still keep a few going. They are good cars . . . but hardly economical modern transportation. Now consider how much antique wiring lies around still doing a job . . . of sorts. Hardly efficient. Pathetically unprofitable when pitted against modern power needs. What are we going to do about it? The following article gives some good reasons for re-evaluating our requirements for reserve capacity and replacing obsolete wiring . . . with new and better products.

ONCE MORE it's a case of growing pains! Today industry has already used up its power reserves—though these were considered adequate ten years ago. Now it's time for another upward revision of our ideas of what is a sufficient power margin for operating the new production tools that have been put in our hands. To power them, utilities are now in the process of re-doubling their load capacity. Our stepped-up rate of production and consumption has telescoped the future . . . even beyond the soberly considered estimates of industry leaders as recently as a decade ago!

The link between tool and power source is wiring. New tasks suggest new techniques . . . new tools . . . new power loads . . . new wiring to carry the load. Yesterday's wiring may bottleneck today's production flow.

Some existing plants haven't spotlighted their wiring in many a year. Now—with new production factors in the picture—it is time for a basic survey of wiring. If it's obsolete, replace it . . . and reap the benefits of more efficient power, greater reliability, and long-range economy.

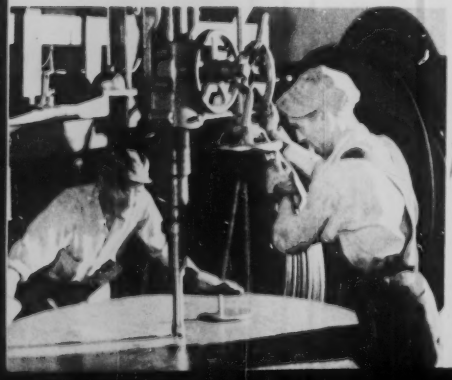
Modern wiring has seen a wealth of new developments—especially in insulation. Let's take a quick look at what's been done. It's all interesting, practical and valuable.

RUBBER INSULATION

Modern wiring may be defined as that approved and accepted since World War II. Twenty years ago we spoke of "enormous strides" in such things as rubber compounding. These resulted in superior products. We

ANACONDA was the first manufacturer of wire and cable to use synthetic resin compounds for insulation. One example is DENSHEATH* — a high-grade and super-aging thermoplastic (vinyl resin). This is widely used today for wiring on (1) machine tools, (2) appliances, and (3) various types of signal systems — as well as for control or switchboard, building or general purpose wiring.

*Reg. U.S. Pat. Off.



DEVELOPMENTS IN WIRING INSULATION

ARE WE ASKING OBSOLETE WIRING TO DO TODAY'S NEW JOBS?

can still speak of "progress." There has been lots of it. They are still striding forward—the chemists, metallurgists, cable engineers and their co-workers. The end is not in sight.

Heat is the great enemy of electrical insulation. But today Code Rubber, Type R, does a much better job in withstanding heat than a few years ago. TABLE I shows how this and other rubber compounds compare.

KIND OF INSULATION	MAXIMUM ALLOWABLE CONDUCTOR TEMPERATURE		
	1940	1947	1953
	degrees C		
Code, Type R	50	60	60
Type RW	50	60	60
Type RH	75	75	75
Type RH-RW	—	—	75-60**
Heat- and moisture-resistant	60-70-75	75-80	75-80
Ozone-resistant* (ASTM oil base)	70	70-75	70-75
Ozone-resistant* (butyl)	70-75	75-80	80-85

*Temperature varies with manufacturer
**whether in dry or moist location

TABLE I

Type RH-RW is outstanding. This is being used so much now—at little more cost than Type R—that the latter has a narrower market than even just after the war. Ozone-resistant, butyl-base compound is another excellent performer. Its stability, long aging, low power factor and other desirable physical and electrical properties under severe operating conditions make it a dependable compound for voltages up to 15 kv and sometimes higher. Several manufacturers supply it.

During World War II natural rubber was out. Synthetic (G-RS) rubber took its place. In just a few years, cable manufacturers found many things in its favor . . . so many, in fact, that the natural product is disappearing as a wire and cable insulation. "Cold" rubber is another development. Coming fast into regular use, it brings improved physical and electrical properties to low-voltage cables.

B-r-r-r . . . now I'm cold!

Another forward stride is the pre-war development and post-war application, in great quantity, of neoprene jacketing for rubber-insulated cable. Dependable under many severe conditions, relatively inexpensive, it is excellent in moist or dry conduit, direct burial, in aerial and other locations.

THERMOPLASTIC INSULATION

You can do a modern wiring job today with materials barely existing or unknown as late as just before World War II. These are the thermoplastics. Two stand out as basic insulations: polyvinyl chloride (vinyl resin and one or more of its co-polymers, which appear under various trade names) and polyethylene.

Polyethylene is a remarkable insulation for many purposes. It made radar possible. Now, however, the real workhorse of the industry is the first—PVC for short.

Millions of feet of PVC are used annually for wiring houses, stores, office buildings, by the armed forces and in many industrial applications. It resists many enemies of insulation: oil, moisture, acids, alkalies, abrasion, greases, and gasoline. With just normal treatment, it has a long life.

There are many other thermoplastics; the list has grown long in just a few years. But only a few others are used for insulations. Among them are Rulan, Nylon, Cardolite, Saran, Tenite II, Styraloy, and Teflon.

Polyethylene has a very high dielectric strength, low power factor and low moisture absorption when compared to vinyl resin. The latter has lower dielectric strength, high dielectric loss, and satisfactory moisture resistance. Vinyl resin resists ozone. Polyethylene is immune to it. This indicates why polyethylene can be used for high-voltage and high-frequency circuits while vinyl resin, which is cheaper, does very well on low voltages. Both have a weakness. They become plastic at comparatively low temperatures. High overloads on these types of conductors must be guarded against. TABLE II lists some comparative values.

Kind of Insulation	Code Type	Application	Maximum Allowable Conductor Temperature and Location (degrees C)
vinyl resin	T	general purpose	60 dry locations
vinyl resin	TW	general purpose	60 moist locations
vinyl resin	—	machine tool control and switchboard	60 in oil 80 in air
vinyl resin	—	appliance wiring	80-90, or 105 in air only*
Polyethylene	—	general purpose	80 usually-special

*depending on compound used

TABLE II

"Thermoplastics help me reduce."

Logically thermoplastics replace rubber insulations for some applications—but not for all. In building wire one outstanding property of thermoplastics is toughness. They require no protective braid. Hence, wire so insulated takes less space.

* * *

This article provides only a brief sketch of a fascinating field. Lower operating costs from more efficient power distribution influence plant profits. In the light of developments discussed here, many readers may want to re-evaluate their own wiring. It's a timely undertaking. We suggest that for more details you write to, or consult with, individual manufacturers.

DURASHEATH* neoprene-jacketed cable has ANACONDA Type ANW (cold rubber) or Type AB (ozone and heat-resistant butyl) insulation, depending on voltage rating. Used for (1) distribution networks and where wet ducts may contain acid or alkali waters, (2) industrial power distribution overhead, in direct burial, or conduit, (3) circuits in conduit—and many other applications.

*Reg. U.S. Pat. Off.

If you want to cut equipment-relocation costs . . .

WIRE MACHINES TO MAKE THEM MOVABLE

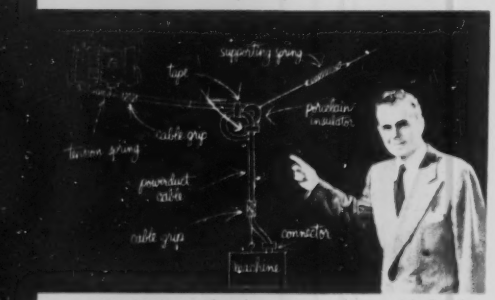
Basic industry strategy calls for more productive machine power. Look into plants like those of the automobile makers. There large banks of automatic machines are lined up in close array. They turn out parts. One bank may occupy only a small part of the long, huge floor area required.

MACHINES SOMETIMES MOVED

Each machine needs a cable. Offhand it seems easy to get cable to machine. But actually some ingenuity is needed to avoid excessive installation costs. The situation is aggravated by the chance that next year —or next month— all machines must be moved in accordance with model changes or plant efficiency.

BUS AND BUSDROP CABLE

You can solve the whole problem very neatly. First install a busduct system on ceiling or under roof trusses. Then connect each machine to it with a flexible cable carrying power and grounding conductors. This cable is called "busdrop cable."

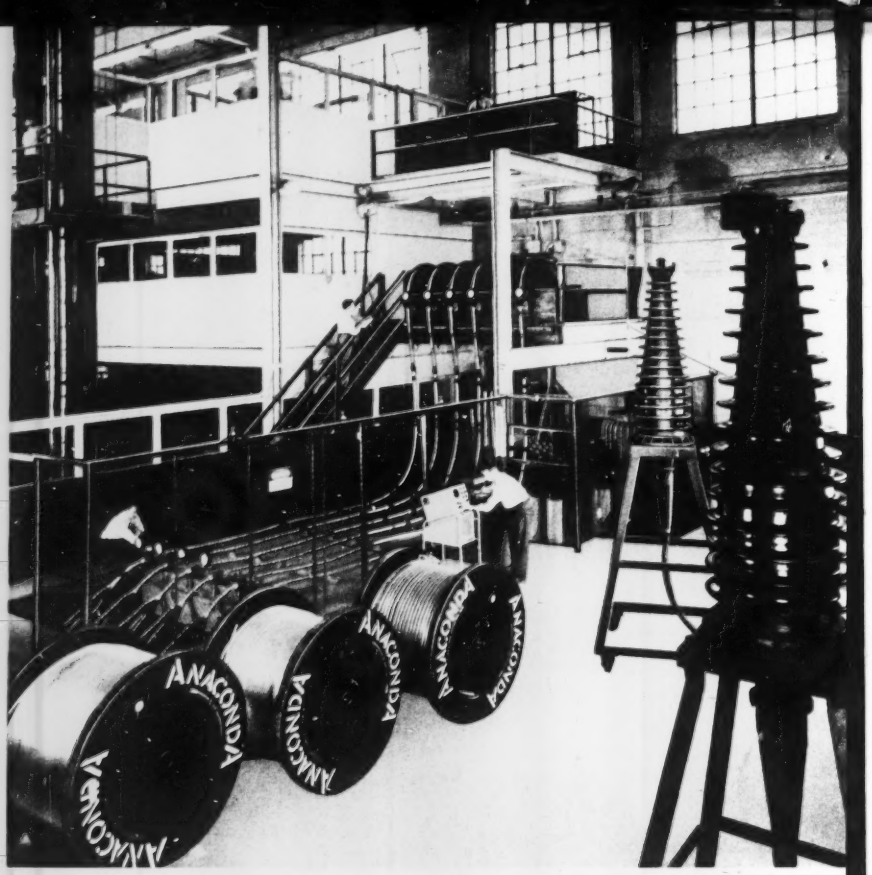


IT'S EASY to plug in your machine with flexible busdrop cable. There's no rigid conduit to rip out later.

TAILOR-MADE SYSTEM

Busduct Power Distribution Systems are widely used. They may be bought tailored to any plant's needs. They are economical; cable can be disconnected and reused elsewhere. This is done often. It means real flexibility, saves time and maintenance costs. It helps industry to keep up its high pace of production.

To do its job right, to last long and to stay neat, busdrop cable must be able to take heavy mechanical abuse and must handle easily. It must be impervious to oils, acids, water, greases, and cutting compounds. And, of course, it's always wise to look for approval from Underwriters' Laboratories, Inc. 3-5384



LAB THAT HURRIES TIME

. . . CUTS YEARS TO MONTHS IN TESTS TO GIVE YOU LONGER-LASTING CABLES

In this Cyclic-Aging Laboratory at Hastings-on-Hudson, N. Y., high-voltage insulated cables race through the calendar. Once the valuable data which cable-aging made available to electrical engineers took decades to accumulate in actual service— often 20 to 50 years. But here a lifetime of experience is gained in a few years. Rigorous 24-hour test cycles simulate actual conditions . . . but are much more severe. Anaconda Engineers get vital data on cable life, stability and other characteristics needed to evaluate cable design.

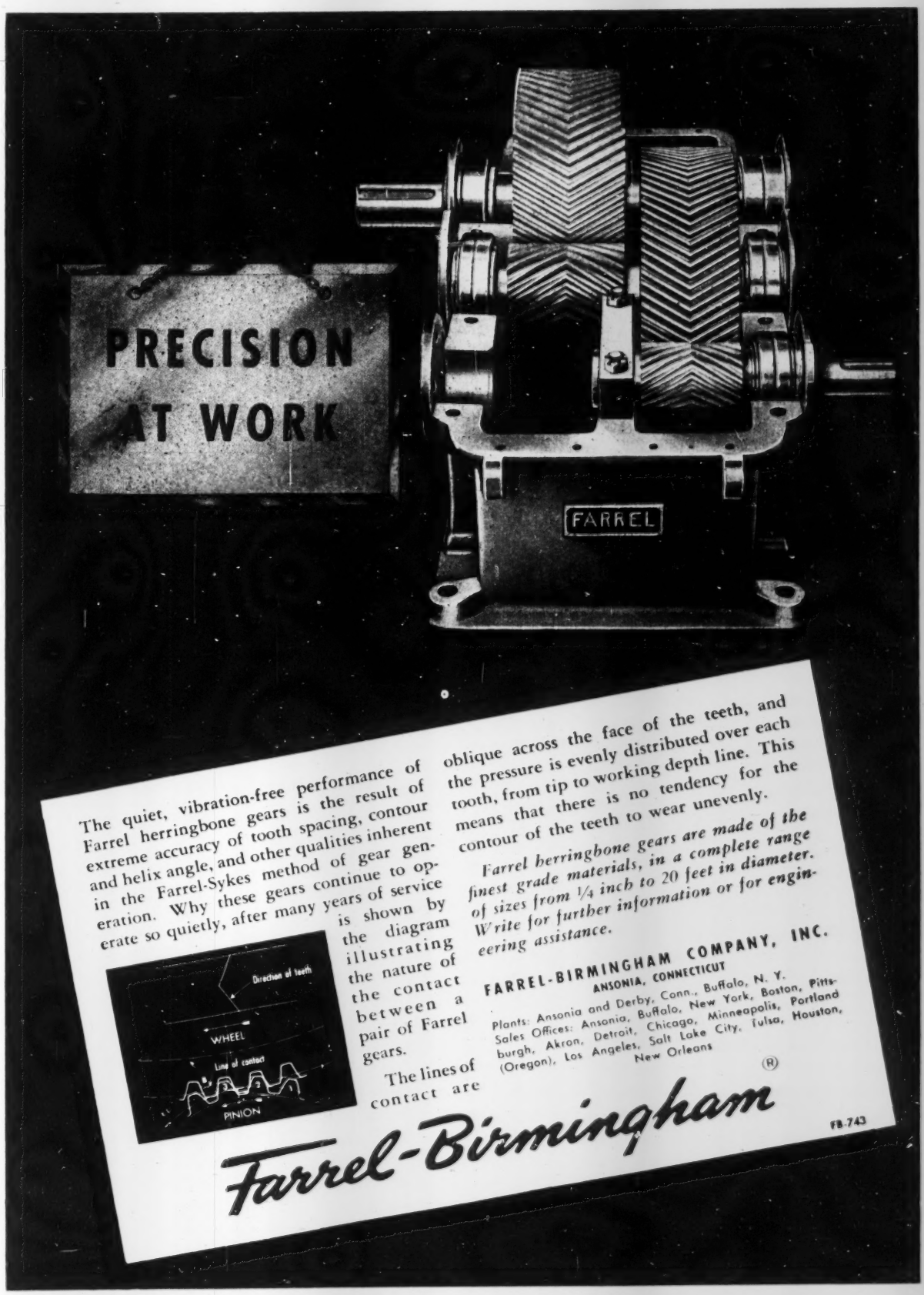
This is typical of Anaconda planning— geared to the future. It is only a part, however, of a company-wide program of expansion and improvement now nearing completion in mills and mines. Net result: better cables, available in larger quantities, that last longer and give you *true* economy in use *when you specify* ANACONDA.

FOR FURTHER INFORMATION about any product mentioned in the pages of this advertisement, see your Anaconda Representative . . . or write to *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

ANACONDA®

TODAY'S HEADQUARTERS FOR WIRE AND CABLE

MAKERS OF building, barn, machine tool, control and communication wire • service and overhead distribution cables, bare and weatherproof including ACSR • portable cords and cables • power and busdrop cables • mine, bridge, aerial, underground, duct, network and submarine cables • parkway, airport and street-lighting cables • station, apparatus and vertical-riser cables • magnet wire • copper, aluminum and copperweld conductors • wire and cable accessories.



The quiet, vibration-free performance of Farrel herringbone gears is the result of extreme accuracy of tooth spacing, contour and helix angle, and other qualities inherent in the Farrel-Sykes method of gear generation. Why these gears continue to operate so quietly, after many years of service is shown by the diagram illustrating the nature of the contact between a pair of Farrel gears.

The lines of contact are oblique across the face of the teeth, and the pressure is evenly distributed over each tooth, from tip to working depth line. This means that there is no tendency for the contour of the teeth to wear unevenly.

Farrel herringbone gears are made of the finest grade materials, in a complete range of sizes from 1/4 inch to 20 feet in diameter. Write for further information or for engineering assistance.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Detroit, Chicago, Minneapolis, Portland (Oregon), Los Angeles, Salt Lake City, Tulsa, Houston, New Orleans

Farrel-Birmingham ®

FB-743

If college degrees were awarded to industrial plants as well as to students, the big Wetherill machinery plant at Sun Ship would certainly be a candidate for an "M.M."—Master of Metals.

Cylinder assembly, shown above, for a massive 2750-ton extrusion press is a sample of the plant's qualification for the title. But—fine example of power and precision that it is—it is just one example of many that can be seen year in and year out in the massive machinery-building plant that has been doing special work for a great variety of industries through the years.

Giant engine lathes with 132-inch swing up to 50 feet in length, small turret lathes, planers up to 14 feet wide, and a special crankshaft machine for shafts of largest sizes are among the modern machine tools which give Sun Ship's plant its versatility and speed in construction. Coupled with the skill and experience of the staff, the facilities of Sun Ship have set a notable record of service to many varied industries in building special machinery . . . and thus helping build a greater America.

Sun

SHIPBUILDING & DRY DOCK COMPANY

ON THE DELAWARE (SINCE 1916) CHESTER, PA.

25 BROADWAY • NEW YORK CITY

HANSEN REPRESENTATIVES
Quick-Connective Couplings
Are Their Business
BUT SO ARE FLUID LINE PROBLEMS

For the help you need—when you need it

KNOW YOUR HANSEN REPRESENTATIVE

E. C. WILD
E. C. Wild Company, Denver
Supplies pneumatic and hydraulic equipment to practically every type industry in the Rocky Mountain Area.

LEO J. SCHINDLER
Leo J. Schindler Company, Dallas
Offers engineering experience in proper application of pneumatic and hydraulic equipment to industries in Texas and Okla.

From years of on-the-job experience with practically every type of air line hook-up, the Hansen representative knows what works—and why it does. Frequently, when you run into trouble, he can quickly suggest the remedy to clear up your difficulties.

That's why in dozens of plants, it's almost routine procedure to call him whenever they need help in a hurry—either when actual troubles arise—or when air line circuits are being planned or altered.

The main job of the Hansen representative, of course, is to supply you with exactly the right quick-connective couplings for your particular requirements. But, as so many maintenance men already know, he can also give you real help on such matters as proper take-off, the pitch of your lines, location of drains, and other details designed to give you a trouble-free circuit operating at top efficiency.

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BIRMINGHAM	FT. WAYNE	NEW ORLEANS
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CLEVELAND	LOS ANGELES	SAN FRANCISCO
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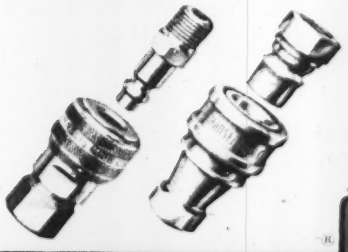
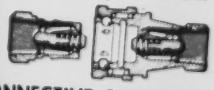


QUICK-CONNECTIVE FLUID LINE COUPLINGS

1. QUICK CONNECTION AND DISCONNECTION
2. INSTANT AUTOMATIC FLOW OR SHUT-OFF

One-Way Shut-Off

Two-Way Shut-Off

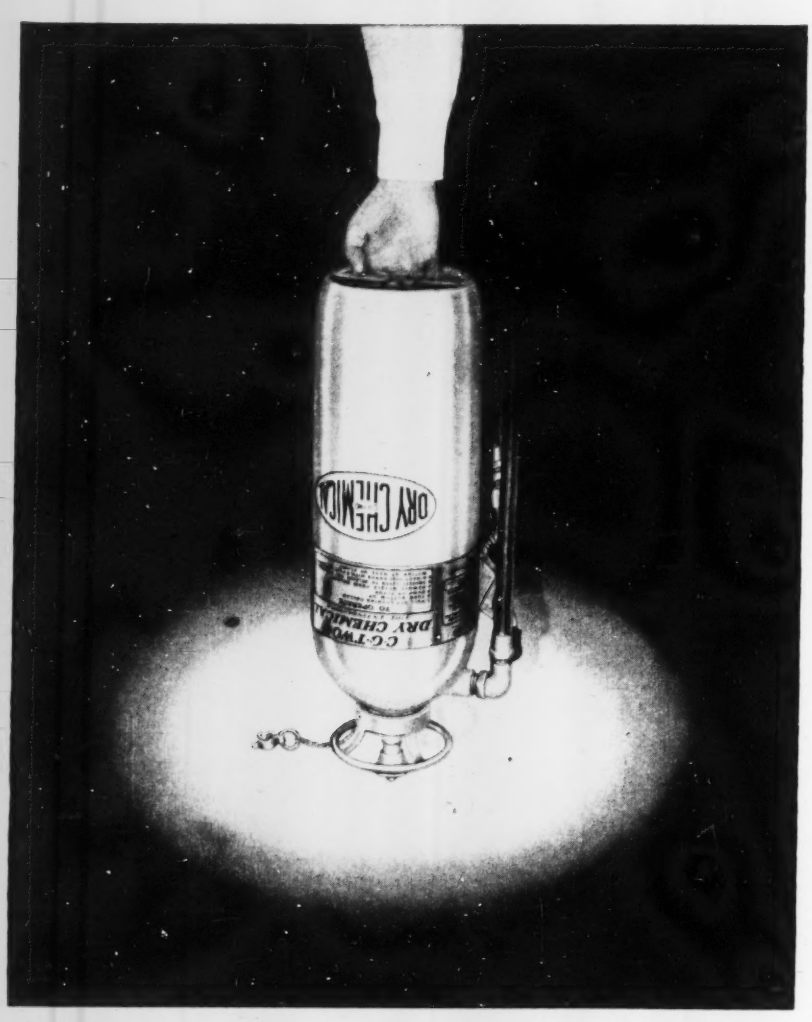


ALSO STRAIGHT-THROUGH QUICK-CONNECTIVE COUPLINGS
Send for Catalog!

THE HANSEN MANUFACTURING COMPANY

4031 WEST 150th STREET • CLEVELAND 11, OHIO

Bump that assures positive results



When fire strikes, seconds count . . . your fire extinguishers must be the right type and function properly from the very start . . . failure means serious losses.

The growing popularity of the highly effective powdered dry chemical fire extinguishing agent may be hampered by a drawback . . . settling or packing can occur after a lapse of time. However, with C-O-TWO Dry Chemical Type Fire Extinguishers there's no chance of this happening.

The exclusive inverting and bumping design of C-O-TWO Dry Chemical Type Fire Extinguishers provides mechanical breakage of the dry chemical by shifting its position in the cylinder. This outstanding mechanical breakage, plus continuous inert gas pressured agitation or fluffing of the skillfully blended free flowing dry chemical, guarantee lasting, foolproof fire protection.

No other brand on the market today gives you this extra margin for positive results. Inverting and bumping is only one of many unique design advantages that make C-O-TWO Dry Chemical Type Fire Extinguishers your best buy for killing flammable liquid and electrical fires, as well as surface fires involving ordinary combustible materials.

With C-O-TWO Dry Chemical Type Fire Extinguishers the heat-shielding dry chemical is a non-conducting, non-abrasive, non-toxic, finely pulverized powder compound . . . blankets fire instantly. Sizes range all the way from 4 to 150 pounds capacity . . . all fully approved by the Underwriters' Laboratories, Inc., Factory Mutual Laboratories and Government Bureaus.

Act now for complete free information on these top quality, sure-acting fire extinguishers. Remember fire doesn't wait . . . get the facts today!

C-O-TWO

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers
Dry Chemical Type Fire Extinguishers
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems
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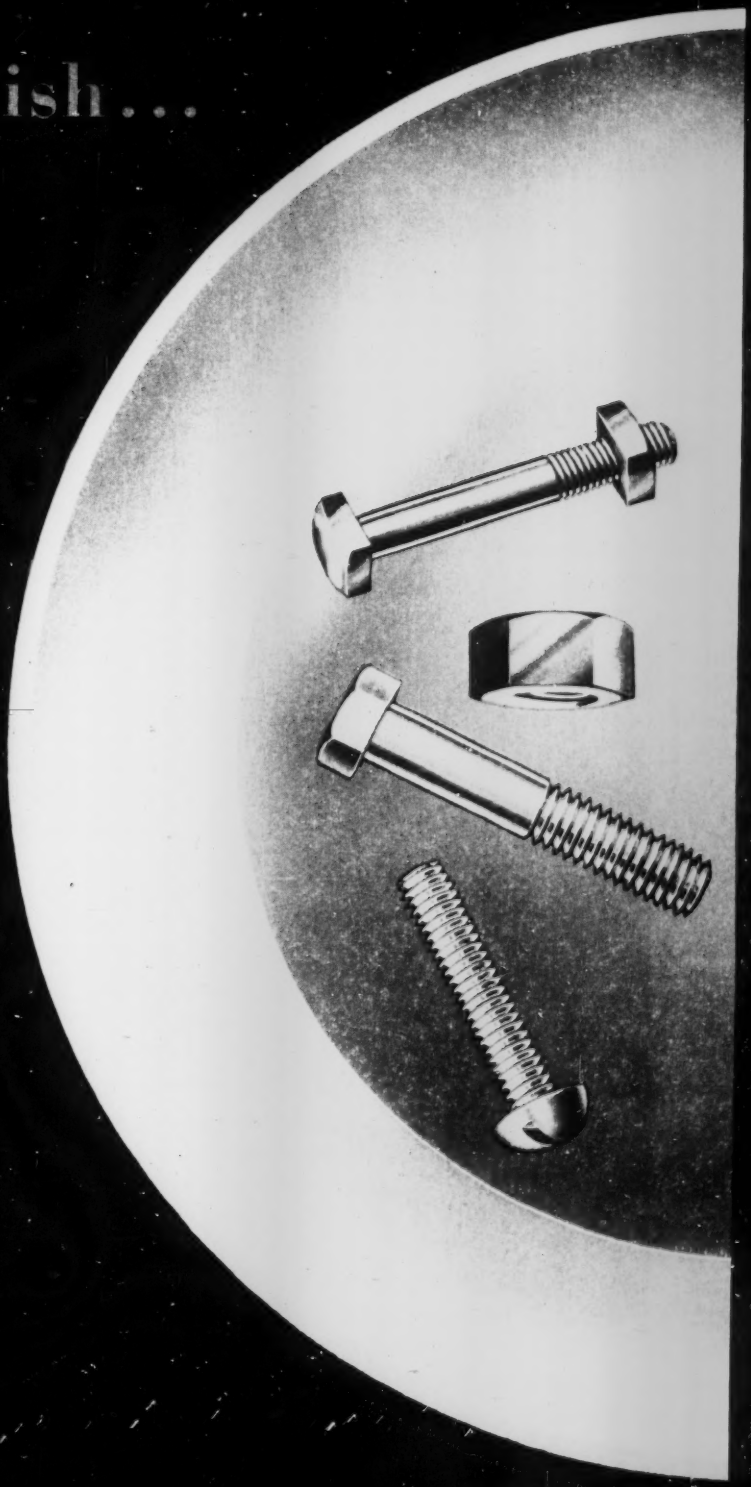

For Industries that Eat Metal Fastenings by the thousand, by the ton, by the million, Sterling Bolt Company has proved its dependability for 35 years.

THIS ADVERTISEMENT CREATED BY THE GERSTEL AGENCY

STERLING BOLT COMPANY

General Offices: 363 West Erie Street • Chicago 10, Illinois

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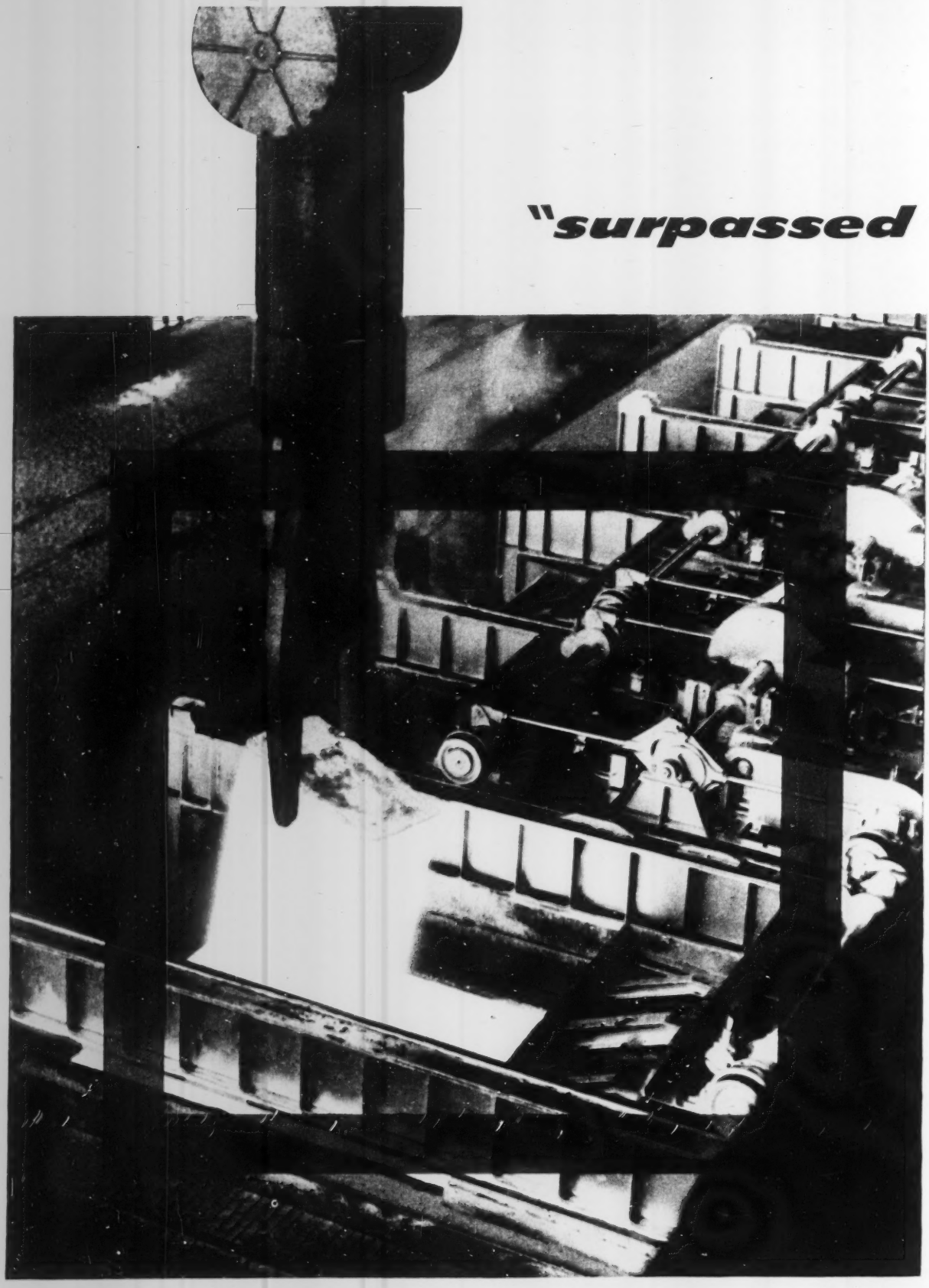
"surpassed



the builder's guarantee"

Why is it that such a high percentage of steel produced in this country passes through Surface Combustion equipment in one or more stages of its processing? Part of the answer might be furnished by a list of steel making advances in which our engineers have participated. The one-way fired soaking pit . . . the remotely located single recuperator serving a number of holes . . . the research which led to substantial increase in pit sizes without sacrificing the simplicity of the one-way firing principle . . . the jet pump which facilitates handling heated air in high volumes with low equipment maintenance . . . these you may recall as developments to which 'Surface' engineers contributed.

There's a more basic answer however: typically expressed in a customer's published report of comparatively recent 'Surface' soaking pit installation: "tons per hour . . . and fuel savings as shown by Btu ton figures . . . has *surpassed the builder's guarantee.*"

This business of making one's word good is by no means unique at 'Surface'. We like to believe however that we combine this old-fashioned way of doing business with an exceptionally effective combination of metallurgical and construction skills based on two generations of experience and growth with the steel industry.

Whatever long-range capital investments you may be planning in making pits, slab heaters, annealing covers, continuous annealers, or any equipment involving combustion, we suggest you tap the "proven resources" of cost-saving skills and experience at 'Surface'.

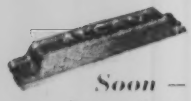
"Operative Results of One-Way Fired Recuperative Soaking Pits by E. H. Cauger and J. C. Stamm, Jr., IRON & STEEL ENGINEER, December 1952

Surface
STEEL MILL FURNACES

SURFACE COMBUSTION CORPORATION · TOLEDO 1, OHIO

One-way fired soaking pits • Billet reheating furnaces • Slab heating furnaces • Continuous type, controlled atmosphere strip annealing and normalizing furnaces • Controlled atmosphere annealing covers for wire and rod • Controlled atmosphere annealing covers for coil and sheets • Continuous furnaces for heat treatment of steel plate • Controlled atmosphere furnaces for carbon correction in high alloy rod and bar stock • Continuous type bright annealing and normalizing furnaces • Prepared gas atmosphere generating equipment • Pit type convection furnaces for rod annealing • Stress relief furnaces • Wire patenting furnaces

MORE POWER FOR ALUMINUM!



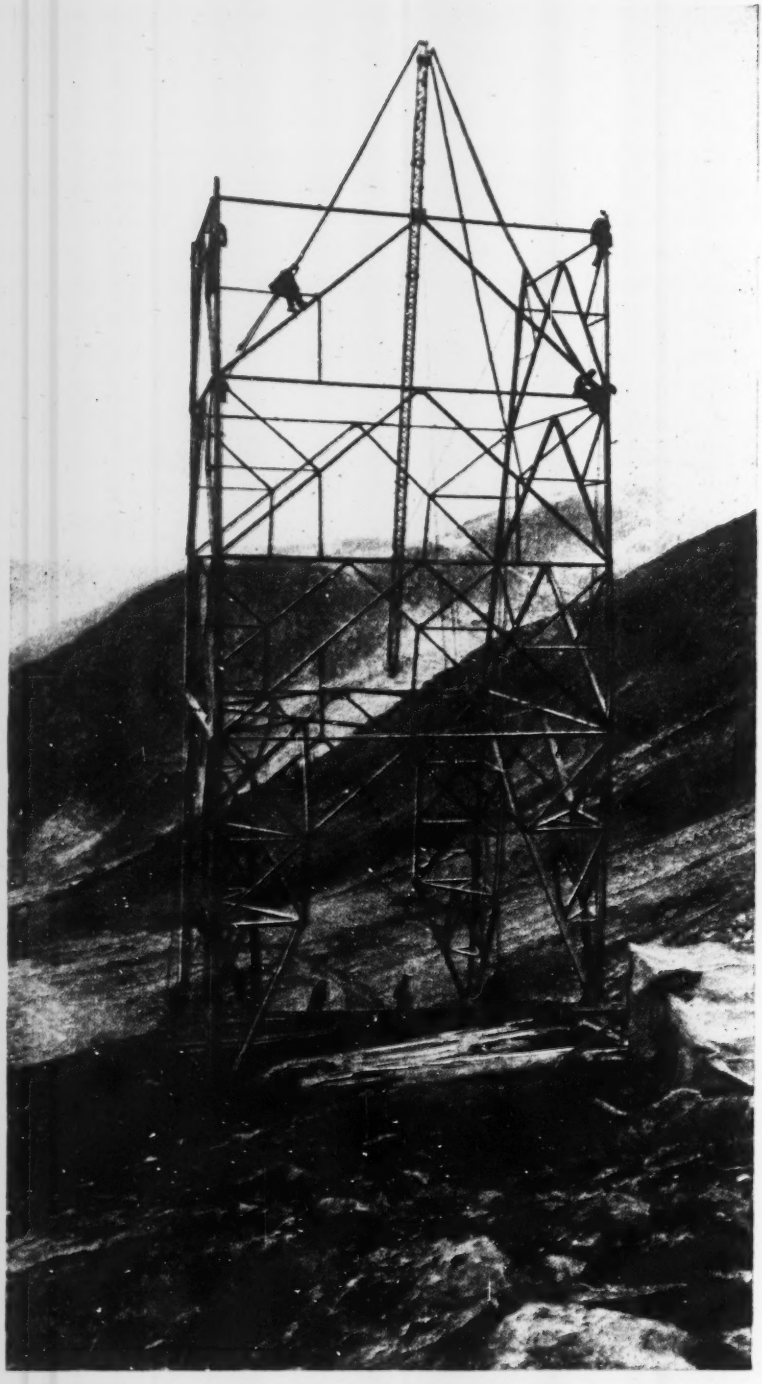
Soon — more aluminum from Canada: Up in Kildala Pass, between Kemano and Kitimat in British Columbia, towers are being erected from a transmission line which is destined to help all America. This line is being constructed to carry more than a million horsepower.

It starts at tidewater at Kemano where a power plant is being hewed out of solid rock, deep inside a mountain — and travels 18 tortuous miles north and west. It climbs 5300 feet up to Kildala Pass, then down again. It spans gorges that exceed a half mile from tower to tower. Its aluminum cables, reinforced with steel, are the largest ever spun.

This transmission line illustrates the extent to which the Kitimat development will increase production of the Aluminum Company of Canada, Ltd. ("Alcan"). With each 20,000 kilowatt-hours of additional electric power, Alcan will produce another ton of aluminum ingot.

As distributor of Alcan aluminum in this hemisphere, the Aluminum Import Corporation is pleased to report that Kitimat is proceeding on schedule.

We'll be glad to help you plan for increased production of lightweight, long-lasting aluminum products — for defense, industry, farm or home.



ALUMINUM IMPORT CORPORATION

Distributing company of the **ALUMINIUM LIMITED** *group, in the Western Hemisphere*

Offices and agents in 40 cities — *Cable address:* ***ALIMPORT***

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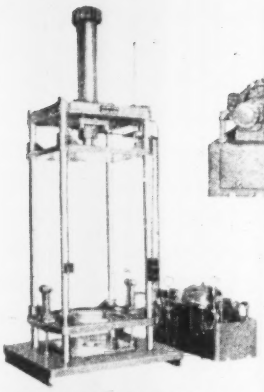
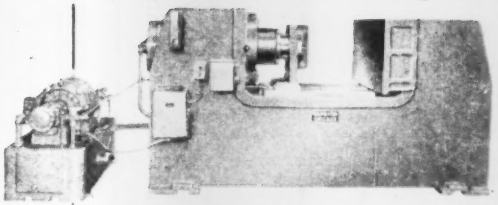
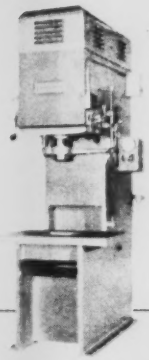


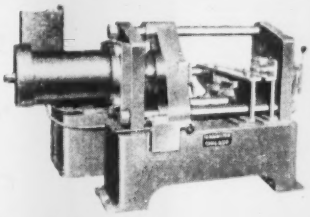
WATER HEATER TANKS are assembled with this 50-ton, 4-column press. Special hydraulic stripper plate raises tank from lower die after assembly.



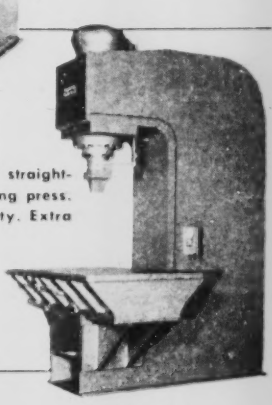
TRACTOR WELDMENTS for main frames and roller frames are straightened with this 100-ton press. Horizontal design permits use of hoist for easier handling.



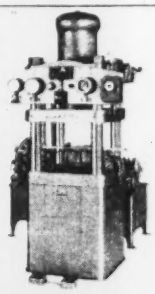
DIE CASTINGS are trimmed on this 25-ton, long stroke, open gap press. Controls reverse on distance; extremely high speed advance and return. Easy on dies. Scrap chute in table.



TRACTOR TRACK LINKS are press-fit assembled in this 50-ton, 3-column press. Assembly includes bushings and connecting pins. Press indexes for various sized links.



HEAVY DUTY straightening and forcing press. 150-ton capacity. Extra reach and large table permit handling heavy work.



HELICAL CUTTER BLADES are formed with this 75-ton, 4-column press. 2-step, timer-controlled operation forms part. Special attachment ejects part and relubricates dies with graphite.

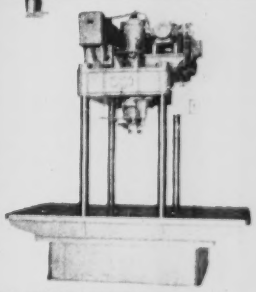
WHEN IT COMES TO PRESSES ...COME TO HANNIFIN

GENERAL PURPOSE 25-ton open gap press. Die cushion under table permits use for drawing operations.

FIBERGLAS PLASTICS are molded with this 50-ton, 4-column platen press. Automatic controls permit high-speed approach, slow closing on dies. Long stroke and extra "daylight" for deep parts.

When your production calls for hydraulic presses, investigate the Hannifin line that includes more than 75 standard models, capacities to 150 tons.

Quite probably you can select the press you need directly from the complete Hannifin catalog . . . or a Hannifin Field Engineer will demonstrate how easily one of these standard models can be modified to meet your requirements. Hannifin Corporation, 1117 South Kilbourn Ave., Chicago 24, Ill.



LARGE WELDMENTS are straightened on this 75-ton, 4-column press. Sensitive pressure control, extra large work table.

Hannifin Representatives Are at Your Service in These Leading Industrial Centers

Atlanta, Buffalo, Cincinnati, Cleveland, Dallas, Dayton, Denver, Detroit, Houston, Los Angeles, Milwaukee, Minneapolis, Moline, New Orleans, New York, Philadelphia, Pittsburgh, St. Louis, Seattle, Richmond, Va.; Rochester, N. Y.; South Bend, Ind.; Washington, D. C.; Worcester, Mass. In Canada, TEM Sales Company, Toronto and Windsor.

HANNIFIN

Hydraulic Presses • Pneumatic Presses • Hydraulic Riveters
Hydraulic Cylinders • Air Cylinders • Air Control Valves

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Hannifin Corporation
1125 S. Kilbourn Ave., Chicago 24, Illinois
Please send me Bulletin 130 on Hannifin Hydraulic Presses.

Name .....
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THE JOBS PROVE IT

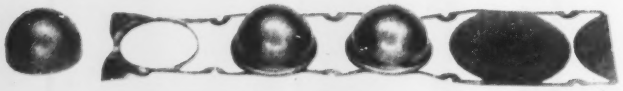
YOU RETRENCH ON STAMPING COSTS WITH HENRY & WRIGHT DIEING MACHINES

In the small area occupied by a compact Henry & Wright Dieing Machine you have a production tool equal in capacity to five or ten conventional presses. Progressive stamping on a Henry & Wright really pays off, because this press is specifically designed for this type of work.

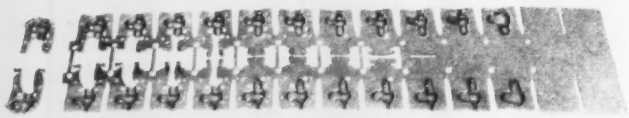
Angular thrust is not transmitted to the upper crosshead. Low center of gravity holds vibration to an absolute minimum. Long ways, plus four post guidance and a pulling instead of pushing stroke, serve to strait-jacket punch travel. Accurate punching produces high quality work and a lot more of it between die grinds. Much less metal is removed when dies are ground.

Get the whole story about the Henry & Wright Dieing Machine—the economies you achieve in die life, inspection, toting, operators. Retrench by modernizing with Henry & Wright.

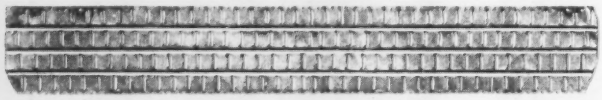
Refrigerator part produced at speed of 65 strokes per minute of .060" cold rolled steel on 100 ton Dieing Machine.



Hemispherical shell 2" deep produced at speed of 60 strokes per minute.



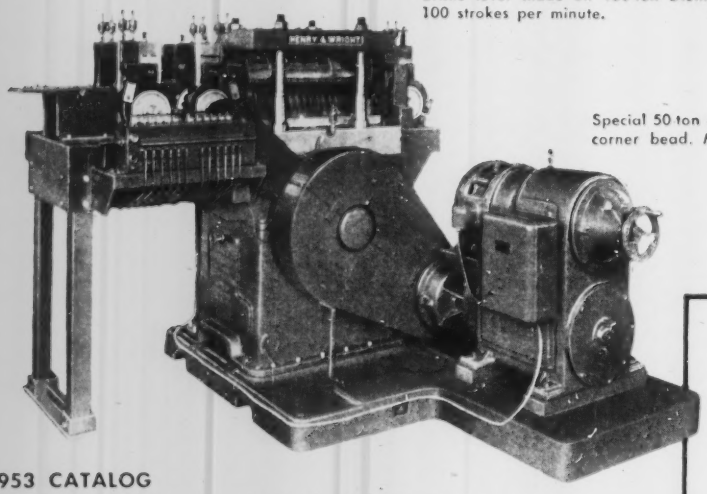
Paired sections of housing produced of .065" hot rolled steel at 60 pairs per minute.



Radiator fin of copper made three at a time at speed of 85 strokes per minute.

Radio part produced one per stroke at speed of 300 strokes per minute.

Brake lever made on 150 ton Dieing Machine operating at speeds in excess of 100 strokes per minute.



Special 50 ton dieing machine for production of expanded corner bead. Machine operates 620 strokes per minute.

1953 CATALOG

Write for your copy on company letterhead to Henry & Wright, Division of Emhart Mfg. Co., 441 Windsor St., Hartford, Conn.

HENRY & WRIGHT

DIVISION OF EMHART MFG. CO.

1938
4770
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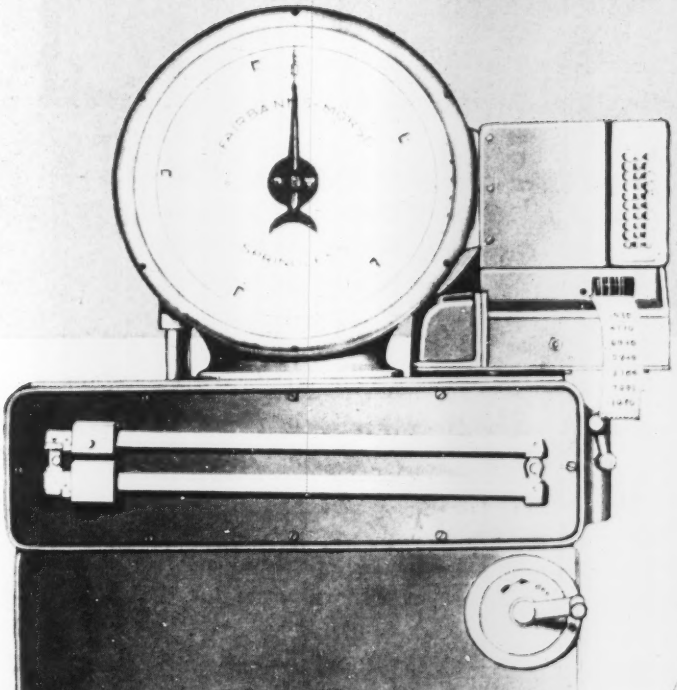
Keep your weights a matter of record

Automatically!



Rule out the chance for weighing errors with a Fairbanks-Morse Dial Scale with Printomatic Recorder. You save annoying, costly receiving and shipping disputes—you have a permanent record of each article weighed *automatically!*

The Printomatic is designed so that other pertinent information may also be printed with the weight for accounting or identification purposes. And, there's an electronic control for materials handling and processing.

See your local Fairbanks-Morse Scale Specialist about the Printomatic Recorder . . . and his complete line of scales of all types. Fairbanks, Morse & Co., Chicago 5, Illinois.

FAIRBANKS-MORSE

a name worth remembering when you want the best

SCALES • PUMPS • DIESEL LOCOMOTIVES AND ENGINES
ELECTRICAL MACHINERY • RAIL CARS • HOME WATER
SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

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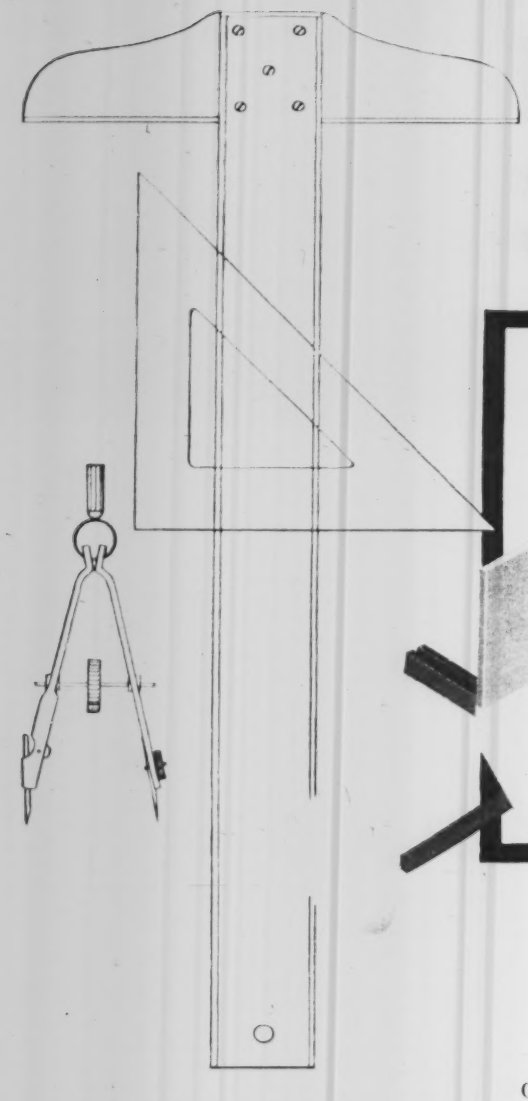

GRAVER will design your Weldments to cut production costs!

Graver's Weldment Division is equipped to design your sub-assemblies and component parts, so that you may expect significant savings by simplifying manufacturing methods.

Graver uses all welding techniques for all types of alloys and carbon steel in thicknesses ranging from ¼ inch to 12 inches. The ability to maintain close tolerances . . . facilities that include one of the largest heat-treating furnaces in the country . . . and the employment of the latest, improved welding methods in successfully fabricating thousands of intricate weldments—all indicate Graver should be *your* weldment source.

Large or small, simple or complex, *all* Graver weldments reflect the top-quality work you have come to expect from Graver.

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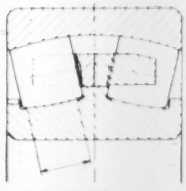
capacity

of spherical roller bearings 25% to 50% by means of improved internal design



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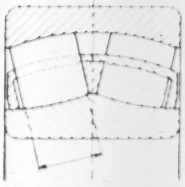
This is the Spherical Roller Bearing design originated by SKF *more than 30 years ago.* The cross-section shows how the integral inner ring flanges, and the undercuts adjacent thereto, limit the effective length of the rollers.



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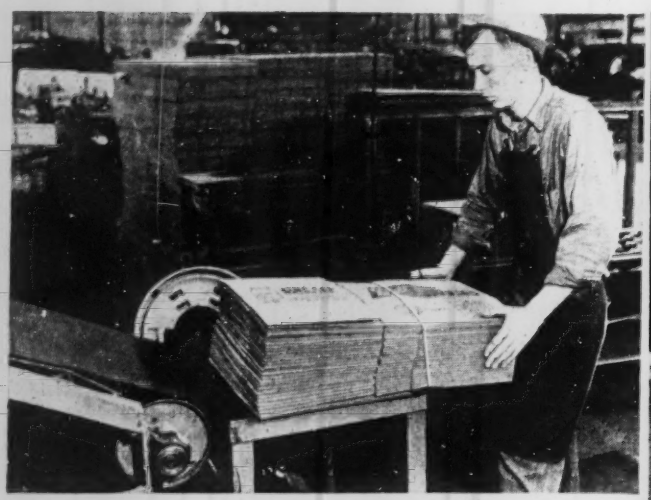

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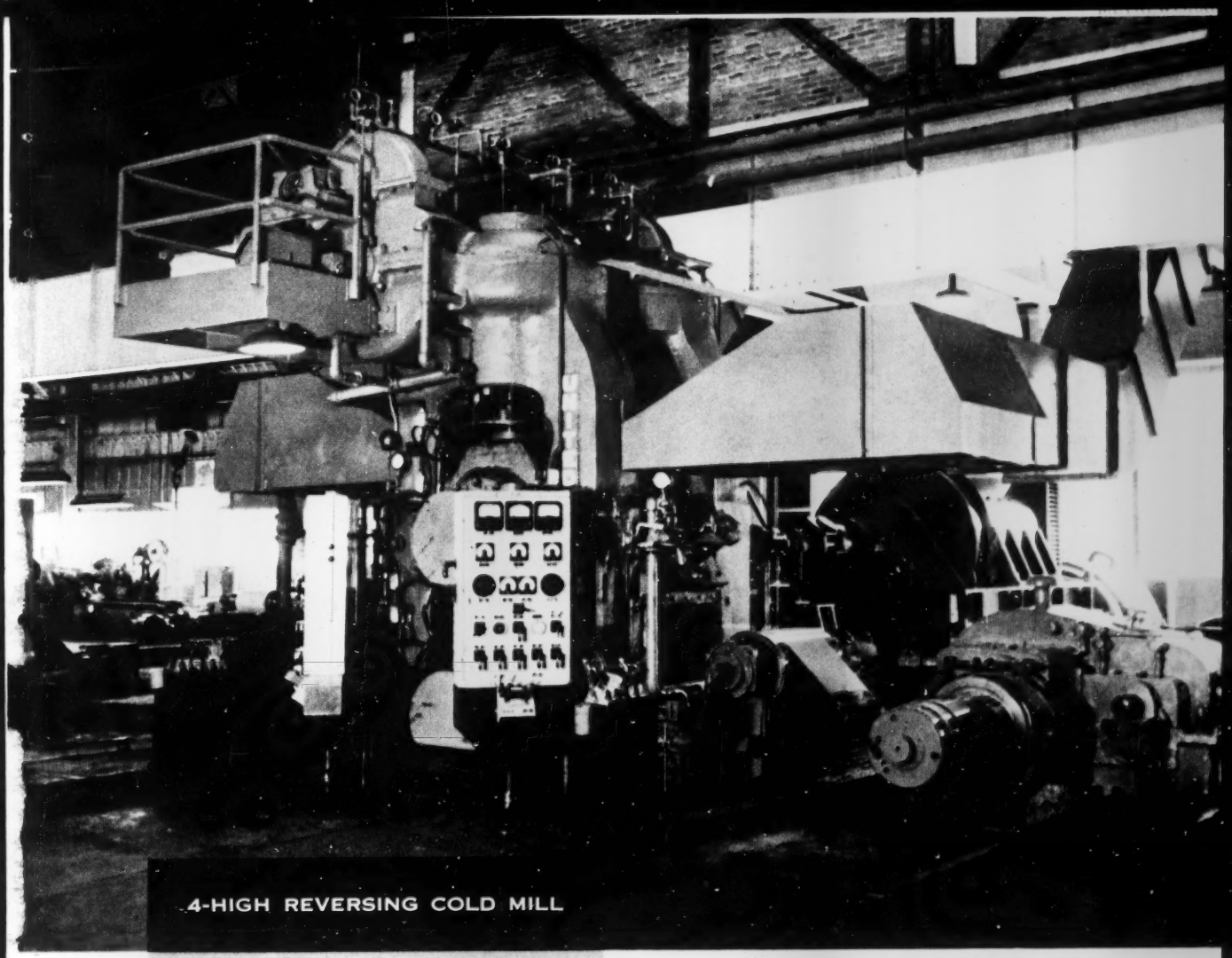

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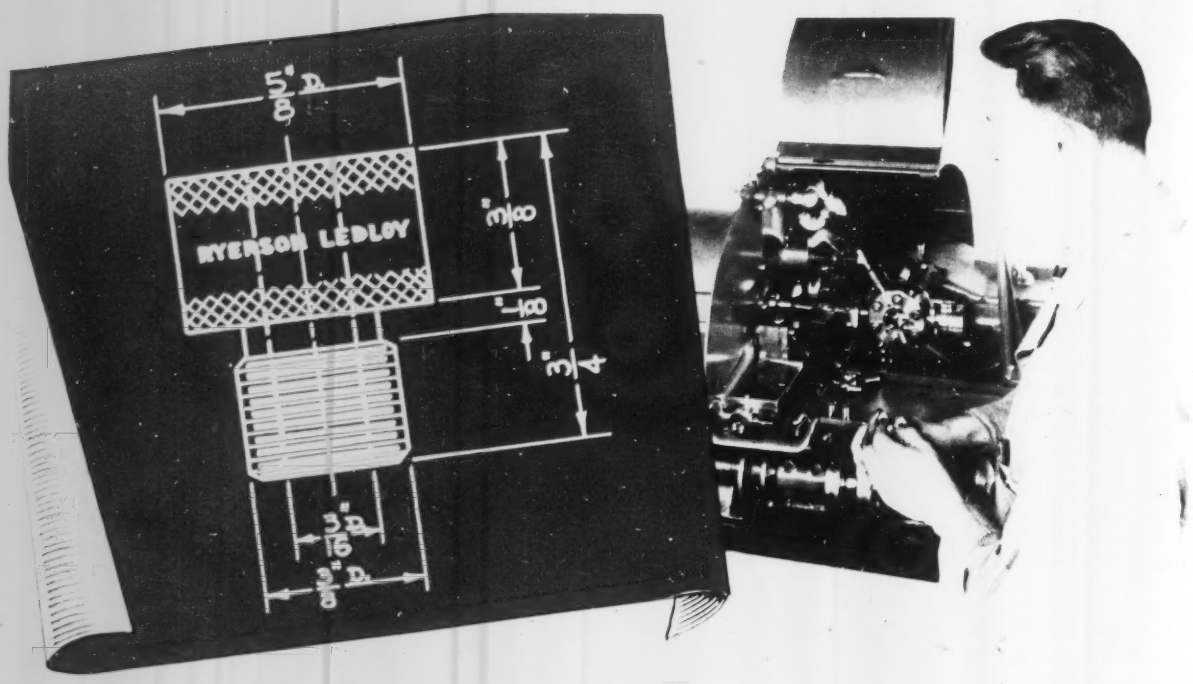

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STEEL
October 12, 1953

Metalworking Outlook

Freight Absorption: Its Price Tag

In 1948, the last full year in which the steel industry absorbed freight extensively, producers picked up a $65-million tab for traffic charges on moving the metal to customers. That figures out to about $1 a ton. The cost per ton—and saving to you—would be more now because freight rates on steel have risen some 15 per cent in the past five years. But the total cost to steelmakers may never again reach $65 million because absorption will be far more limited than before. The practice will be followed only when competitive conditions warrant it on particular products.

A Merger in Motordom?

Merger speculation concerning Nash, Hudson and Packard is rife. Looming as a more distinct possibility is a program of interchangeable parts and joint purchasing among the independents to meet the growing competition in the auto market. Nash President George W. Mason indicates his firm would not be averse to such a setup.

Layoff in Steel

Inventory adjustments due to model changeover is cited by Great Lakes Steel Corp., Detroit, in announcing a layoff of 600 workers. Confined to merchant mills, the production curtailment is expected to last two to three weeks.

The Workweek in 1999

"In all probability a workweek of 30 hours or less will materialize well before the end of the century." So says Dr. John T. Rettaliata, president of Illinois Institute of Technology. Thus, the problem is to satisfy the demands of an expanding economy for a greater flow of goods at the same time that the people producing goods are working fewer hours. The only solution to that problem is to increase output per man-hour, largely through technology, says Dr. Rettaliata. Although he expects greatly increased productivity, he does not expect the workerless factory of the science fiction novels.

New Era for Scrap Dealers

The slump in scrap prices (p. 87) is hitting dealers harder than it would have before World War II. Because of big tax bites and because the major share of dealers' profits in the past decade have been spent for modern equipment, dealers today are not in as favorable a cash position as in the old days to build up inventories during a slump. Today they are more comparable to a manufacturer in that they have to rely on current income to a larger extent. One man in the industry says that currently many dealers are "equipment poor."

Uniform Excises in 1954?

Watch for Congress to pass, after stormy debate, some kind of uniform excise tax in 1954. Nobody wants it, but some kind of higher levies will

have to be enacted to get needed revenue now that corporate and personal income taxes seem certain to drop next year. Even the National Association of Manufacturers is pushing for a uniform 4.5 per cent national manufacturers' excise tax on all manufactured products except for food, medicine, liquor and tobacco. NAM would continue the present excise tax on liquor and tobacco. The influential Rep. Noah M. Mason (Rep., Ill.), a member of the tax-writing Ways & Means Committee, says he favors a uniform excise levy.

More U. S. Money for Research

Department of Defense is spending more money on research and development than at any other time in U. S. history. Actual expenditures for research this year will be about $1.3 billion on about 8000 projects. From 1947 through 1950, the amount spent averaged about $500 million per year. In the last fiscal year about 60 per cent of the money went to civilian industrial organizations, 10 per cent to civilian nonprofit institutions and the rest to government units. Some $25 million to $30 million a year is for basic research.

Rebuttal by Wilson

Secretary of Defense Charles E. Wilson says reports have been exaggerated that contractors will be hurt financially by the new policy of reducing progress payments to companies in defense work. "We have been overpaying many contractors—that is, paying them sooner than we should," he says, "and now we intend to pay them only what is properly coming to them." He estimates that the savings will be comparatively small, since the overpayments come to between $200 million and $300 million.

Straws in the Wind

Nearly 50 cases already are piled up to face the Supreme Court and its new chief justice, Earl Warren . . . United Steelworker President David McDonald is getting tough with members about wildcat strikes in his organization . . . Perfect Circle Corp. Chairman Lothair Teetor is slated to become assistant secretary of commerce to succeed Craig R. Sheaffer . . . Defense Secretary Wilson is studying a proposal to add seven or eight wings to the present goal of a 120-wing Air Force . . . Federal Reserve System banks record a decrease of $147 million in metalworking loans in the week ended Sept. 30, the largest decrease since the reporting system was set up in early 1951.

This Week in Metalworking

Now it's official—Business & Defense Services Administration is the name for the new agency to take over NPA functions (p. 88) . . . Decontrol of nickel doesn't automatically increase the supply of the metal (p. 89) . . . Deliveries of bearings are improving (p. 90) . . . A new policy on idle defense tools should pacify industry (p. 91) . . . America is making progress toward industrial mobilization, says Defense Mobilizer Arthur Flemming (p. 93) . . . Colorado Fuel & Iron Corp. has opened its new pipe mill at Pueblo, Colo. (p. 97).

Just as a football player needs protection . . .

IRON and STEEL
***Need* PROTECTION**

If your product is made of iron or steel, and exposed to the elements, protect it against the ravages of rust by Hot-Dip Galvanizing — the best possible rust preventive when applied by Hanlon-Gregory. For longer life, greater uninterrupted service and substantial savings in maintenance, specify Hot-Dip Galvanizing . . . SEAL IT IN ZINC.

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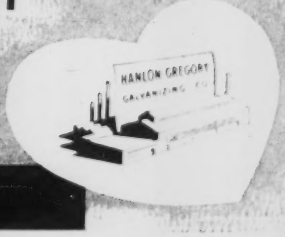
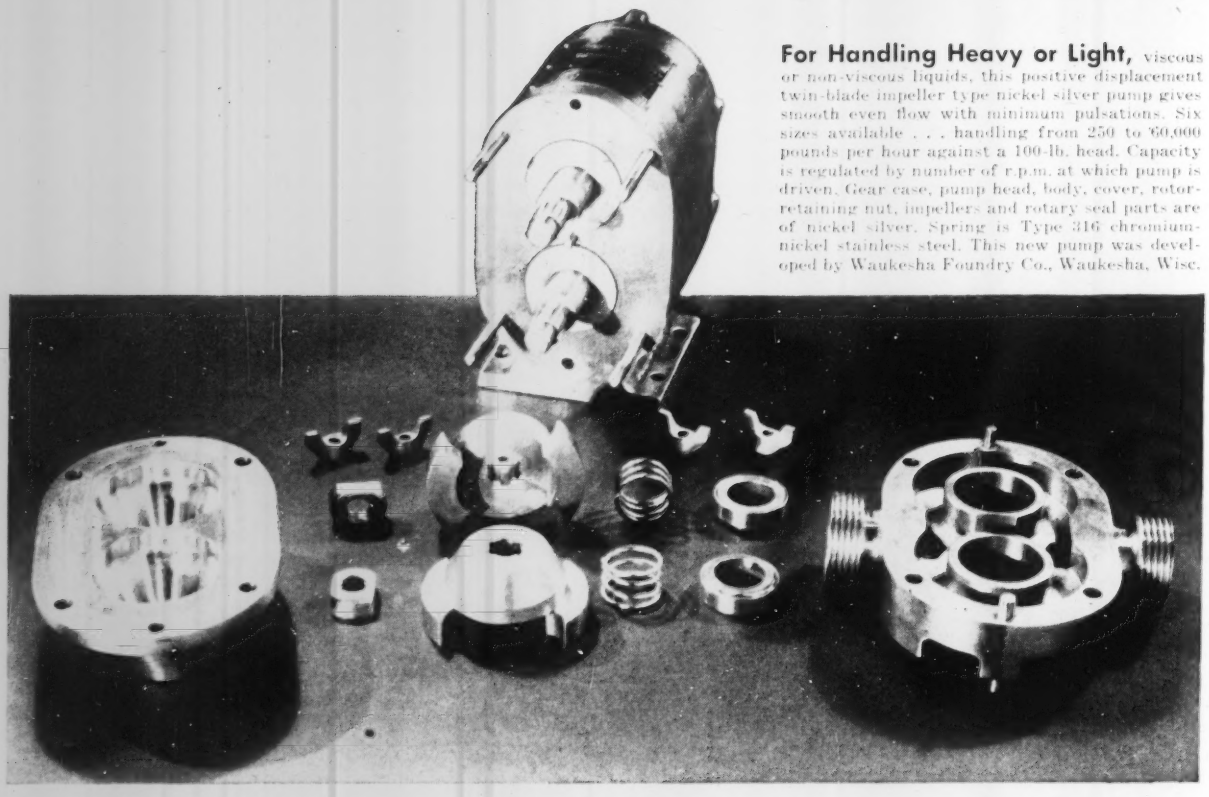


HOT DIP

galvanizing . . . pickling . . . painting . . . oiling



For Handling Heavy or Light, viscous or non-viscous liquids, this positive displacement twin-blade impeller type nickel silver pump gives smooth even flow with minimum pulsations. Six sizes available . . . handling from 250 to 60,000 pounds per hour against a 100-lb. head. Capacity is regulated by number of r.p.m. at which pump is driven. Gear case, pump head, body, cover, rotor-retaining nut, impellers and rotary seal parts are of nickel silver. Spring is Type 316 chromium-nickel stainless steel. This new pump was developed by Waukesha Foundry Co., Waukesha, Wisc.

NEW PUMP SHOWS HOW

Nickel Silver meets exacting demands

Here's a pump used by processors of milk, canned foods, paints, cold cream, adhesives and scores of other products . . .

Its components are made of nickel silver to provide essential strength, and to assure non-pitting silvery white surfaces that resist wear and corrosion. Moreover, parts with bright, lustrous working surfaces permit quick, thorough cleaning as well as easy maintenance.

Solid white metal all the way through, nickel silvers usually provide greater strength and corrosion-resistance than do ordinary brasses and bronzes.

Wrought or cast, the impressive beauty and moderate cost of nickel silvers . . . plus their ready response to fabrication by ordinary methods . . . make these alloys particularly useful for improving both quality and quantity of output.

Gain competitive advantages by using these alloys. The several grades of nickel silvers permit selecting one with the best set of properties for any reasonable fabrication and service demands. We shall be glad to furnish you with counsel and data on these versatile alloys.

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Opportunity for Management

Next week the 35th National Metal Congress and Exposition will be held in Cleveland. In observance of this important annual event, the editors have devoted a large portion of this issue to details of the technical sessions and exhibits and also to the timely subject of selecting the right materials for the job.

We believe that as the thousands of visitors to the Cleveland show and congress examine the 450 exhibits and listen to the hundreds of technical papers, they will appreciate how important it is for management in the metalworking industry to take a new look at the problem of selecting materials. Since the end of World War II the challenge of jet propulsion, atomic energy and numerous other developments has led to the introduction of many new materials. Almost every day, some new requirement sends metallurgists into a frantic search for new materials that will meet the need.

As a result, we have today a greater choice of ferrous, nonferrous and affiliated materials than ever before. In a general sense, management has been rather slow in recognizing just what this wider choice means in terms of lower costs and improved quality of product.

For instance, it is not unusual for materials to represent the largest single item of cost in the manufacture of some products. Sometimes the materials bill will amount to as much as 80 per cent or more of the total cost of manufacture. This being true, management is remiss unless it gives careful attention to the problem of selecting the materials that are best for the job from the standpoint of several important factors.

Operating men, design engineers and others involved in selecting materials usually are alert to new developments. They do not deliberately shut their eyes to the opportunities to try out new or alternate materials. However, in their preoccupation with their immediate jobs, they may fail to realize how rapid is the present pace of the introduction of new materials. Management will do well to appraise this fast pace at its true worth and to capitalize on the great opportunities afforded by the wider choice of better materials.

E. L. Shaner

EDITOR-IN-CHIEF

FAITH IN OUR FREEDOM: Almost every executive in the metalworking industry would wish to read Clarence B. Randall's newest book, *Freedom's Faith* (198 pp., Atlantic-Little, Brown, Boston; $3.00), if he understood clearly the manner in which the author approaches his subject. Mr. Randall, chairman of Inland Steel, previously had written *A Creed*

for Free Enterprise in which he outlined the good points of the American way of life. In *Freedom's Faith*, he expands upon his earlier work.

He starts from the premise that the United States has been thrown into a position where it should provide leadership for the world. In many ways the nation is poorly prepared to provide this leadership. Unfortunately, many industrial executives, who should contribute heavily to this leadership, are ill-equipped to do so.

Mr. Randall believes that just as an industrial executive insists upon taking a physical inventory periodically, just so should he take a periodic inventory of intangibles. In reality, Mr. Randall's new book is his inventory—his own fresh survey of the intangibles which command his loyalties. Reading his inventory will inspire you to conduct one of your own.

INVENTORIES OF IDEAS: Following Mr. Randall's formula, you will take an inventory of your ideas as to just what it is that makes our country great. You will analyze phases of the American way of life and write into your inventory your opinion as to how it can be improved. You will consider the several threats to our way of life. You will review your ideas as to how best to cope with the manifold problems of the human element in industry. You will probe your attitude toward the relations between industry and education. You will re-examine your beliefs in the tremendously difficult field of foreign trade. You will explore the possibilities of new responsibilities and new opportunities in the new leadership that will be proffered industrial executives in the exciting days ahead.

FOR THE INARTICULATE: Tremendously important in any appraisal of Mr. Randall's book is the fact that he is promoting a procedure of articulateness for industrial executives, rather than a hidebound allegiance to the orthodox concepts of the free enterprise system. He is trying to excite industrialists to think more for themselves; to study local, state, national and world problems more carefully; and to direct their influence toward projects that are really worthy from the standpoint of public interest.

In some respects, the major emphasis of the book is directed toward the need of greater articulateness on the part of American industrialists. Most of them can do a far better job than they have done to date.

WEAK ON PROMOTION: Many readers of *Freedom's Faith* will find especial fascination in Chapter VIII, "For the Inarticulate." It deals with the problems that confront the industrial executive when he yields to the temptation to address a public audience. Clarence Randall has had a wealth of experience in this field and his observations will be welcomed by hundreds if not thousands of men in industry who have been enticed into talking to technical, trade or other audiences.

In reality, some representatives of the metalworking industries have been negligent in complying with requests for speakers on many occasions. Too often editors of industry publications have been enlisted to do a job that should have been done by a manufacturer's representative. A realistic survey of the metalworking industry would show that the facilities for the effective promotion of good public relations are woefully inadequate.

COURT PLAN BACKFIRED: When Earl Warren became the fourteenth chief justice of the United States Supreme Court, it was Justice Hugo Black who administered one of the oaths of office. He did so by virtue of the fact he is the senior member of the court. It seems like only a short time ago that Senator Black became the newest member of the court. What great changes have occurred in those 16 years!

In 1937 President Roosevelt asked Congress for power to enlarge the Supreme Court to 15 justices. He wanted to appoint young liberals to offset the influence of elderly justices who refused to resign. He constantly berated the "nine old men"—Van Deventer, McReynolds, Brandeis, Sutherland, Butler, Stone, Hughes, Roberts and Cardozo. The Senate defeated Roosevelt's "court packing" scheme by 70 to 20. Smarting under this defeat, the President defiantly named Black to succeed Van Deventer, who had resigned at 78.

Two benefits resulted from Roosevelt's attempt to "pack" the court: One, Black turned out to be a better justice than F.D.R. expected. Secondly, the Senate became more than ever determined to preserve the integrity of the court.

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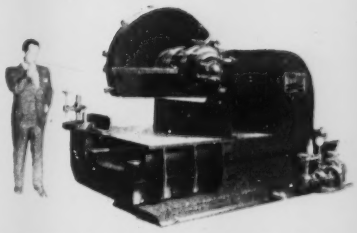

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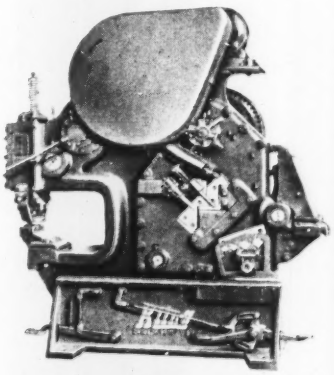

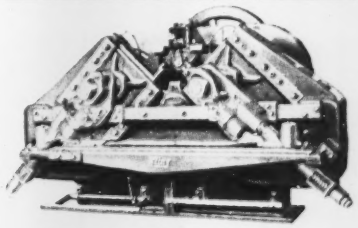

KLING DOUBLE ANGLE SHEARS

. . . 2 Shears in 1 machine

This high-production machine can give you more and cleaner cuts on many different shearing operations. For instance you can simultaneously shear round bars and bar angles on left side and structural angles and flat bars on the right. Automatic hold-downs as well as automatic lubrication are available.

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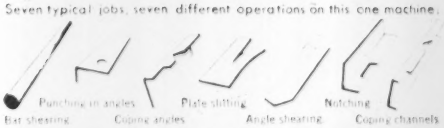
Seven typical jobs, seven different operations on this one machine.



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One of these Kling Machines can turn out the work of a separate punch, angle shear, bar shear, plate shear and notcher—yet it costs little more than a single-purpose punch. For speed and safety, each end operates independently. Foot pedals allow both operators to keep hands free to hold work. Available for light, medium or heavy work.

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Get hair-line precision as well as speed, in sheet and plate cutting, whether you do one or many of the operations shown. One Kling Shear will often eliminate the need of several old-style shears or other equipment. Many attachments available. A wide range of types and sizes to meet your specific requirements, up to a rated capacity to shear 1" thick mild steel.

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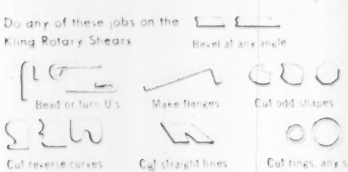
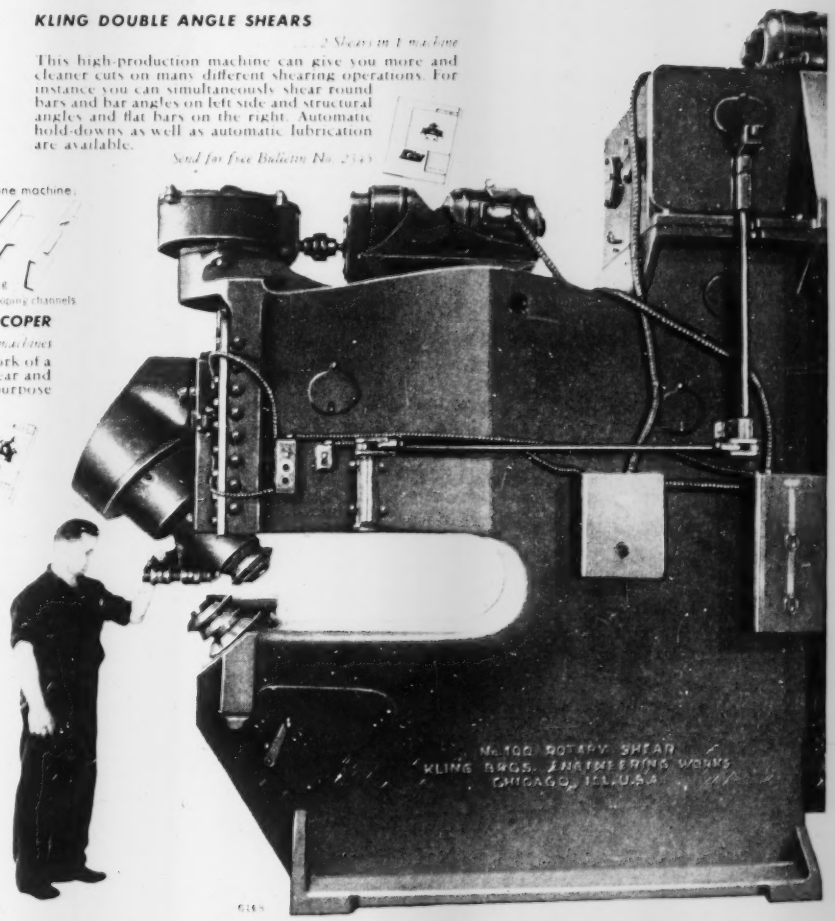
Do any of these jobs on the Kling Rotary Shears





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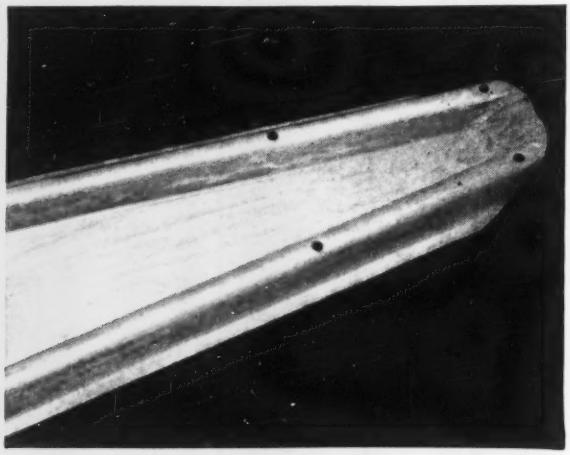
Poultry feeder bowl,* drawn from a sheet of drawing quality TI-CO, Inland's galvanized steel whose coating does not crack, flake or peel even under severe forming.



AND THIS...

Not a crack, not a flake in the protective zinc coating when this grain bin roof panel was drawn from Ti-Co. And use of Ti-Co eliminated need for re-dipping or painting crimped ends—took 180° crimp in stride.

When it comes to tough forming, Ti-Co can take it. Because this drawing quality Inland galvanized sheet has a tightly adhering, flexible zinc coating that flows with the base metal as it's deep-drawn, stamped, bent or lock seamed.

Ti-Co is produced from hot and cold rolled Inland sheet steel and is continuously annealed and galvanized by the patented Sendzimir process, which eliminates the brittle iron-zinc layer found in ordinary galvanized sheets. This flexible, uniform coating means Ti-Co galvanized products are easier and cheaper to produce, and stay serviceable and good-looking longer.

Because of the terrific demand for this premium quality sheet, you may sometimes find Ti-Co difficult to obtain on short order. But please bear with us. We're doubling our capacity during 1954 to help assure plenty of Ti-Co for everyone. Ti-Co is worth waiting for!

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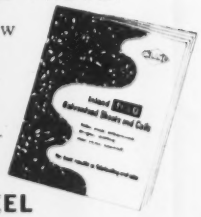

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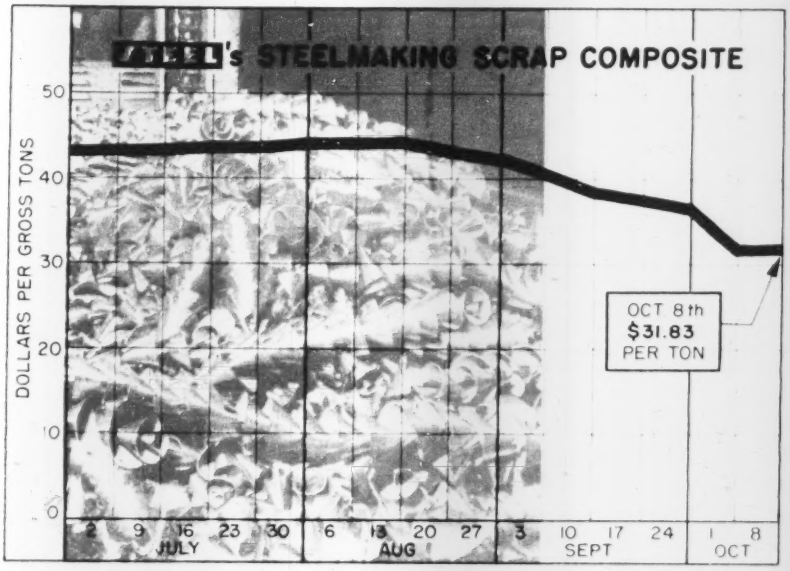


based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania

Scrap: Has It Hit the Bottom?

There's nothing wrong with the industry that a little business couldn't cure. But it doesn't look like that will happen until at least November

SCRAP DEALERS and brokers are learning the truth of the old axiom that what goes up must come down. But how far down is the big question of the moment, with prices on almost all grades of iron and steel scrap still showing the effects of a dormant market.

The market is not sick, as might be the impression from the above chart. The present decline stems from a readjustment to more realistic inventory and price levels which many men in the industry saw coming long ago.

Simple Logic—As a dealer in Detroit told STEEL, "Few dealers were unable to anticipate the decline, because with prices so high, there was only one direction they could go." In some areas, the bottom has been hit. One broker said the drop is beyond the bottom, but he doesn't think it will go any lower. But in other parts of the country, some dealers are predicting prices will drop as much as $5 a ton more within the next two months before things get much better. A little business last week brought STEEL's steelmaking scrap composite up from $31.50 to $31.83, the first rise since Aug. 13.

There is nothing so wrong with the industry that a little buying on the part of the steel plants wouldn't help quickly. However, little help can be seen in the immediate future from that source. Scrap inventories in the steel industry going into the third quarter were high, in most cases between 60 and 90 days. Steelmakers were geared for capacity-plus operations, but they found that operations were sliding off to as much as 85 per cent of capacity. That further extended the scrap inventory, so they slowed down or even stopped buying scrap. There is no indication that the operating rate the last half will return to capacity levels of the first half.

Just Enough—In addition, steelmakers are buying some scrap directly from metalworking firms just enough to keep them from buying appreciable tonnages on the open market and sending the prices back up. Thus, with winter setting in, many steel plants already have inventories large enough to satisfy their needs.

This situation is not conducive to large stocks in the dealers' yards, either. With selling prices so low, they cannot collect the material at a low enough price to make any profit after processing.

A Long, Long Time—Most experts in the field expect the lull in buying to extend at least until November. By that time, steel mills will know whether or not they have sufficient stocks for the winter and whether operating rates will rise or fall. One dealer predicted that the break will come in mid-November and that prices will rise and level off about $3 to $5 above present marks.

One outgrowth of the situation is a renewal of the demand by scrap brokers and dealers for export licenses. This is centered in the West Coast area, but it has a spokesman in the Institute of Scrap Iron & Steel in Washington. Few scrap men are asking for across-the-board free exporting privileges, but they want a liberalization of the present government policy which allows free trade only with Canada and limits quarterly export quotas to Mexico.

Still Good—Regardless of the lull in present buying, this year will show an over-all record consumption of 34 million tons of purchased scrap, says E. C. Barringer, executive vice president of the Institute of Scrap Iron & Steel. That surpasses the old record of 33.8 million tons set in 1951.

Scrap Man Opposes Lifting Ban

Reed M. Booher, vice president of Wilkoff Co., Youngstown, is one scrap executive that doesn't believe the government should relax its ban on exportation of scrap metal. He feels that the steel companies should boost their use of the material and relieve the present price situation and at the same time conserve their ore supplies.

Mr. Booher says: "It just doesn't make sense to me to worry about dwindling iron ore supplies and then permit exporting of scrap which drains off our resources."

BDSA Springs to Life

After many delays, the new Business & Defense Services Administration gets under way

AFTER MONTHS of stop-gap measures, the Business & Defense Services Administration went into effect Oct. 1 as a permanent agency of the Commerce department. The new unit brings promise of closer linkage between industry and the government.

BDSA takes over the administration of NPA regulations still in force, will take five other Commerce department offices under its wing and will establish 25 industry divisions to provide "a focal point for effective co-operation between government and business."

Who's Who—H. B. McCoy, former acting administrator of NPA, is acting administrator of BDSA. The three assistant administrators are: Samuel N. Comly of Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.; Leonard E. Pasek of Kimberly-Clark Corp., Neenah, Wis.; H. J. Wallace of U. S. Steel Corp.'s National Tube Division, Pittsburgh. William E. Haines, as assistant deputy administrator, completes the hierarchy of the new Commerce department organization.

In addition to taking over the defense and mobilization functions of NPA, BDSA will administer the Commerce department's Office of Technical Services, Office of Distribution, Field Service, staff functions of the Industry Evaluation Board and Office of Industry & Commerce, including its Trade Association, Commodities Standards and Area Development divisions.

What's What—Industry divisions will be set up for: Agricultural, construction and mining equipment; aluminum and magnesium; automotive; building materials and construction; business machines and office equipment; chemical and rubber; communications equipment; consumer durable goods; containers and packaging; copper; electrical equipment; electronics; food industries; forest products; general components; general industrial equipment; iron and steel; leather, shoes and allied products; metalworking equipment; miscellaneous metals and minerals; power equipment; scientific, motion picture and photographic products; shipbuilding, railroad, ordnance and aircraft; textiles and clothing; and water and sewage industries and utilities.

Written into the official manual of operation of BDSA is the admonition that industry divisions will "co-operate . . . in developing programs of practical value to the business and industrial communities to foster a common understanding of the problems of government and business," as well as "collect, analyze and disseminate information on . . . business activity in specific industries . . . for government purposes and as a service to business and trade groups."

NEA

H. B. McCOY
. . . acting administrator of BDSA

H. J. WALLACE
. . . one of three assistants

RFC Loan Liquidation Begins

Even though it bowed out of the loan business Sept. 28, some of Reconstruction Finance Corp.'s busiest days are ahead. It will try to liquidate its assets totaling about $1,095 million by June 30, 1954, the expiration date.

"Approximately 90 per cent of our business loans are rated as good loans. They could be absorbed without loss by private interest," Kenton R. Cravens, RFC administrator, states.

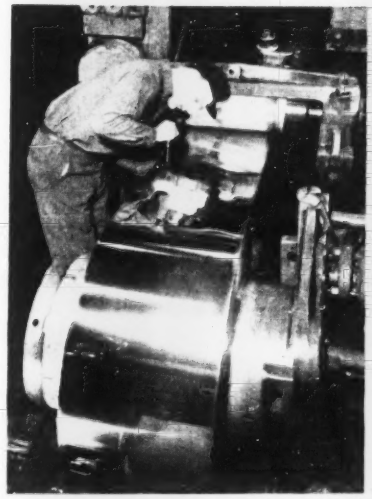
Tax Experts Favor Change

Tax experts are in favor of amendments to the Internal Revenue Code which would enable the steel industry and metalworking manufacturers to acquire and hold essential raw materials without carrying such inventories at values in excess of current prices, says American Iron & Steel Institute.

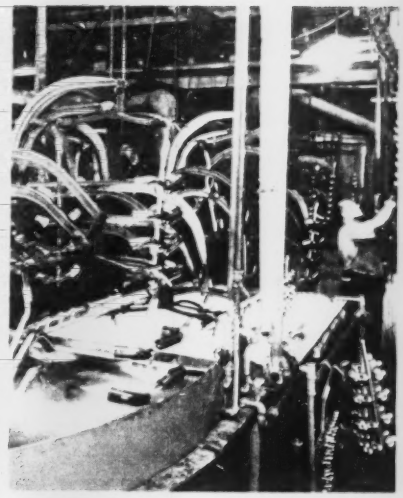
These students of taxes assert the amendment needed is one which would enable manufacturers using LIFO (one of two accounting systems recognized by the Treasury department) to value their inventories at cost or market, whichever is lower. That would provide more sound accounting and make it practical to acquire inventories of scarce materials without fear of penalties under the tax laws.

LIFO (last-in, first-out) assumes the last item acquired for inventory is the first consumed. FIFO (first-in, first-out), the other recognized system, assumes the first item acquired for inventory is the first consumed.

Under FIFO, as prices of materials already acquired mount, inflation accumulates in inventories which creates large segments of what accountants call unrealized profits. It exists only on paper and cannot be realized until the inventory is sold. In the meantime, dividends, wages and taxes must be paid on it. Then if deflation comes suddenly, this unrealized profit may vanish or turn into losses.



Sharon Steel



Frederic B. Stevens

LESS FOR STAINLESS? MORE FOR PLATERS?

Nickel: Decontrol Shifts the Pattern

Small processors and fabricators of nondefense items stand to gain by the shift from government to civilian control of nickel. There still won't be enough to go around

DECONTROL OF NICKEL on Nov. 1 could prove a boon to small business.

But the hard fact is that decontrol does not add a single pound of nickel to the total U. S. supply. Chances are there won't be enough to go around to all nonmilitary consumers of nickel in the country for some time to come. So that while some civilian nickel consumers will benefit under civilian distribution, others stand to lose.

Big First Step—The Business & Defense Services Administration, in its first major action, was ordered by Secretary of Commerce Sinclair Weeks to remove all restrictions on nickel, nickel-silver and nickel-bearing stainless steel on Nov. 1 which relieves industry of filing forms NPAF 60, 102, 113 and 114. BDSA officials say stockpile, AEC and defense requirements will be taken care of under the Defense Materials System.

Responsibility for divvying up supplies of "free" nickel, that is supplies after defense needs are met, now reverts to civilian industry. International Nickel Co., which supplies 80 per cent of the nickel consumed in the U. S., has promised the secretary of commerce that such "free" nickel "will be distributed to the civilian economy in a fair and equitable manner."

That means some changes in the distribution pattern.

Patterns—A comparison of present nickel distribution with precontrol nickel distribution gives some indication of where the shift will come.

Consumption	Percentage of Supply	
	1950	1952
Stainless & other steels	39	45
Nonferrous alloys	28	31
High temperature & electrical resistance alloys	6	8
Electroplating	18	7
	91	91
All others	9	9

From that comparison, it appears electroplaters are due to get a larger share of nickel. At least platers will have their hands out since end-use is no longer restricted and they can get back into markets which dried up under control. Platers will also go back to their normal formulas for plating. Acceptable substitutes could not be found during the days of shortage.

Nickel-Needy Mob—Of course, electroplaters have gotten some relief from government controls during 1953 so that their gains now may not be as dramatic as other nickel users which have been neglected thus far. Nickel-silver mills, for example, can now expect to get a bigger share of available nickel. It's possible that nickel markets based on new applications will get more attention, too. Many of these nickel-starved firms which can expect to gain by the decontrol are small processors and fabricators.

Stainless steel and nickel alloy producers, on the other hand, stand to get less nickel for a while under decontrol. They've gotten more than their historical share under forced-draft defense mobilization. A drop of 5 per cent for nickel-bearing stainless products is not unlikely as that would bring such firms back about in line with their precontrol take. (For more analysis on the effects of nickel decontrol, see the market section, beginning on p. 351.)

Here To Stay—In all probability, continuing high demand for nickel will force the use of manganese (as a substitute for part of the nickel content) in order to increase or even maintain production of chromium-nickel stainless steels on a large scale. No doubt both producers and consumers, if given their choice and unlimited nickel, would prefer to stay with the established types such as 301 and 302. But in view of past experience (nickel was one of the first metals to be controlled, the last to be decontrolled) use of manganese in stainless will probably grow.

Defense requirements are one of the biggest unknowns in the distribution equation to be evolved. Defense needs still take nearly 10 per cent of available nickel. If stockpile requirements are upped, for example, that would leave less left over for civilian distribution.

Two to three months will pass before the civilian-controlled distribution pattern takes definite form.

Bearings: Smooth Supply Ahead

Lead time on standard antifriction bearings has improved about 50 per cent during 1953. Further easing is looked for into 1954

"ORDERS I DIDN'T expect filled for another three months have been dropped at my door."

That was one antifriction bearing distributor speaking of the greatly improved delivery position of the bearing industry. Standard bearings, which early in 1953 had lead times of 4 to 6 months from manufacturer to distributor, now can be delivered in 2 to 3 months. Precision and special bearings currently have delivery times of 4 to 6 months contrasted with 6 to 8 months earlier this year. In the case of a few ultraspecial bearings or very uncommon sizes, delivery takes longer.

Combo for Speed — Improved bearing deliveries result from a combination of softening up and catching up. Defense orders among tank, aircraft and other military equipment producers have been stretched out. They're now accounting for 10 to 15 per cent of bearing output. Orders from the automakers have eased since midyear, too. That adds up to some softness in bearing markets. Antifriction bearing manufacturers have thus been able to catch up with demand as there has been a "tremendous," though untabulated, expansion in bearing manufacturing facilities since World War II.

Certificates of necessity for $70 million worth of new works have been allowed antifriction bearing makers since Korea, but not all of those certificates have been used up completely. It doesn't appear that they will be used soon.

In the Mind—Another reason behind the easing supply of antifriction bearings is the change in buying psychology of users. One salesman for a roller bearing firm was asked by his sales manager why X Company, in his territory, had only ordered half as many bearings this year as they had last. The salesman explained that X Company is now carrying only 3 months' stock on hand rather than the 18 to 24 months' stocks they had built up in 1952. "I see no let up in the use of bearings among my customers," says this salesman, "but the customers are letting us keep the stocks on hand now."

Even with the changing conditions this year the 66 manufacturers of antifriction bearings, which includes producers of ball, roller and needle bearings, expect shipments in 1953 to be $600 million (see the chart), about the same as last year. An over-all average price increase of 5 per cent in 1953 probably inflates the dollar figures while unit shipments decrease some from last year. At that, it will wind up the second best year for the industry.

Only the Best — Chief civilian customers remain the automakers, steel mills and machine tool builders. Other substantial markets include farm machinery, high speed machinery and the railroads. Electronic applications are contributing to a trend toward smaller bearings. Motor manufacturers and oil field equipment producers have shown surprising strength as bearing customers in this year of softening. One distributor in Pennsylvania reports 30 per cent of its sales go to oil companies, primarily for their foreign operations.

On the whole, export trade has been fairly well sustained this year, accounting for 10 per cent of total shipments. Imports are not bothersome. "Why would an American manufacturer buy foreign-made bearings when he'd have to wait longer for them and have little recourse if the bearings went bad," seems to sum up the American manufacturers' attitude.

Outlook 1954 — Professional seers associated with the industry are busy trying to gaze into the future for the 1954 business outlook. At the moment they look for a drop of 5 to 10 per cent in business for 1954—which would still be well above antifriction bearing shipments in 1947 of $352.5 million. Even with the drop, 1954 may be the third best year the industry has ever had.

"The industry will have to step up sales efforts before long, though," says William F. Chase, president and general manager, Bearing Service Co., Pittsburgh. "Sales are good so far but competition is growing."

Owners, Union Join in Plan

Management and labor joined hands to start a plan to share productivity gains when Dusing & Hunt Inc. and United Furniture Workers of America—CIO, Local 37, installed the Rucker Share of Production Plan at the com-

pany's Buffalo plant which turns out fireproof doors and trim.

Leon F. Dusing and Charles Dusing, officials of the company, and Richard May, president of the local union, said, in a joint statement, "The future of our company and its employees will be increasingly bright under the Rucker Plan in proportion to our increase in productivity." Both sides emphasized the plan had no connection with company profits. "Whether or not the company makes a profit, our employees are paid their constant share of production values . . . The gains from increasing productivity, when coupled with expanding volume which is management's responsibility, will take care of company profits," said Leon Dusing.

Hardware Takes the Spotlight

Hardware manufacturers, dealers and distributors had a big week last week as they held the eighth National Hardware Show in New York and the eighth Annual Builders' Hardware Exposition in Cleveland.

The former show, at which over 900 manufacturers displayed their wares, started off with a bang when B. F. Goodrich Co., Akron, ordered $600,000 worth of power lawn mowers from Moto-Mower Co., Detroit. Goodrich will retail the mowers through its chain of 500 stores and retail tire dealers.

Riding the Wave—Occupying all four floors of Grand Central Palace and the entire Seventy-first Regiment Armory, the closed show attracted more than 40,000 buyers and wholesalers to make it New York's biggest industrial show. Over 10,000 lines of hardware and allied products worth in excess of $2 million were on display. While there was no central theme for the show, the "do-it-yourself" atmosphere predominated. Most buyers were agreed that this trend has given the whole hardware industry a big boost.

R. T. Hughes, vice president in charge of sales for Utica Drop Forge & Tool Corp., Utica, N. Y., said manufacturers of small hand tools had a backlog of perhaps nine-tenths what it was 18 months ago when business was at its peak. Howard C. Wilson, managing director of Hardware Institute, said a price increase of 5 to 10 per cent on those tools is possible early next year because of increased cost of labor.

Smaller—The Cleveland exposition, which was sponsored by National Contract Hardware Association, was also closed. It was composed mainly of exhibits for door handles, locks, hinges and other builders' hardware. Registration was over 2000. Last year this segment of the hardware industry did a $250-million business.

U. S. Industry Takes the Lead

"Powder metallurgy in the U. S. has finally succeeded in forging ahead of the European industry, both in terms of practical applications and advancement as a science," Kempton H. Roll of the Metal Powder Association told a group of some 40 metallurgists visiting the U. S. under the auspices of the Foreign Operations Administration.

Mr. Roll cited pressing demand for structural powder metal parts and time for basic research in this country against a huge restoration job since World War II which postponed research in Europe as the forces that gave the U. S. industry the lead.

Construction Boom Continues

New construction maintained its booming rate during September as expenditures hit $3.3 billion, virtually the same as the record August figure, statistics from the Departments of Commerce and Labor indicate.

Private construction at $2.2 billion is up 8 per cent from September, 1952; public expenditures at $1.1 billion remain unchanged.

Commercial building rose contraseasonally to a new peak in September, and private outlays for public utility construction held at the August level. Residential and highway construction declined seasonally, and public school building continued its uptrend which began in March.

For the first 9 months of this year, expenditures for all types of construction amounted to $25.9 billion, 7 per cent above the same 1952 period.

New Plans for Idle Tools

Excess defense production equipment will go for civilian output only in unusual cases

MACHINE TOOL builders and other capital equipment manufacturers got an answer last week.

In response to their complaints about the U. S. plan to dispose of idle defense tools, (STEEL, Aug. 24, p. 39), Defense Mobilizer Arthur S. Flemming announced a tougher policy whereby excess equipment can be leased for civilian manufacture only under exceptional circumstances.

Background—The debate started late last summer when the government revealed a four-point program to dispose of excess equipment. One of those points—to lease defense-idle tools for civilian production—created the fuss. Actually, the government has leased such equipment only in a couple of cases—notably to Studebaker Corp. which got $200,000 worth of tools when its truck production ended in September. Those contracts already made will stand under the new policy, but similar arrangements will be hard to negotiate from now on.

Now, such deals will require the approval of Office of Defense Mobilization. ODM promises to give an O.K. only in extraordinary cases and only when it receives a recommendation from the Department of Commerce or the Small Business Administration.

Spelled Out — The new policy, spelled out in Defense Mobilization Order VII-4, provides that production equipment owned by the Defense department for which there exists a known or anticipated mobilization need will be kept in efficient operating condition in "package" form at or near the plant which will operate in case of an emergency. Equipment is to be stored in central government warehouses only when storage space is not available at or near a plant.

The same provisions—to keep equipment in "package" form and to limit leasing for civilian manufacture—also apply for defense production equipment owned or controlled by government agencies other than the Defense department. The order was effective Oct. 9.

A. O. Smith Corp.'s "lazy Susan" type of turntable at the weighing-in station speeds up the handling of raw materials that go into electrode coating mixes

A. O. Smith Corp. Opens New Plant in East

IN A BID to tap the full potential of its eastern and southeastern markets for welding electrodes, A. O. Smith Corp., Milwaukee, has unveiled its new, million-dollar plant at Lancaster, Pa.

Opening of the additional facility underlines the fact that welding product sales at A. O. Smith have been going places since 1946. Increase from 1946 to 1952 has been to the tune of 179 per cent, according to John J. Bohmrich, manager of the welding products division. Taking some of the load off the Milwaukee plant was one of the chief reasons for going to Lancaster.

Happy Coincidence — Mass production of electrodes that give stable and uniform welds is a tricky business; wire and coating compositions are of great importance, but good housekeeping and meticulous quality control also play major roles. Both of the latter objectives fit hand in glove with the character of the Pennsylvania Dutch community, company officials are quick to point out.

Located on a ten-acre tract that was farmed last year, the plant shows a Dutch-like respect for cleanliness. Every 24 hours its 41,000 sq ft of floor space will be vacuum cleaned. Brooms are taboo.

Windows and skylights were bypassed to control ingress of air. Incoming air, clean as it is, will be treated in a wet-type Rotoclone; and to keep dust moving out instead of into the structure, a slight, internal air pressure will be maintained. Propane gas, also chosen for its cleanliness, will be used in the 150-foot-long baking oven and in heating the plant. Fluorescent lighting gives off 53 foot-candles over working areas and 26 foot-candles in storage areas.

Production — Now interviewing more than 100 job applicants, the company plans to operate around the clock with a crew of 50, including administrative personnel.

Within a short time, the extrusion press on the plant's first line will start turning out electrodes at the rate of 20 per second. When further expansion is warranted, space is available for two more lines.

Great Lakes Steel Gets Write-off

Great Lakes Steel Corp., Ecorse, Mich., received the largest certificate of necessity for rapid tax amortization issued by the Office of Defense Mobilization between Sept. 10 and 23. The certificate is for a $10.8-million expansion of the National Steel Corp. subsidiary's steel sheet, plate and strip facilities; 50 per cent rapid amortization is allowed.

ODM issued certificates for 74 projects amounting to $38.8 million during the period.

Atomic Flight Near?

Lockheed contract reveals plant-makers are already at work on design study

TOMORROW'S atomic-powered airplanes, as big as B-36's, may be able to fly 2 million miles or 80 times around the earth without refueling!

Engineering already under way on planes was disclosed with the announcement that Lockheed Aircraft Corp., Burbank, Calif., is the third West Coast airplane manufacturer to be awarded an Air Force contract for preliminary design study on a nuclear-powered aircraft.

The First Two—Other manufacturers at work on atomic-powered plane projects are Consolidated Vultee Aircraft Corp., San Diego, Calif., and Boeing Airplane Co., Seattle. General Electric Co. and Pratt & Whitney Aircraft Division, United Aircraft Corp., are developing atomic power plants for the airplanes.

Lockheed engineers state that atomic-powered airplanes will need heavy landing gears to support the great weight of atomic power plants. Wing structures, they say, will be simpler than for current planes because all fuel will be carried in the fuselage.

Power-Packed Pound—Performance of atomic aircraft is a top secret, but it has been estimated that one pound of uranium 235, equivalent to 6 million gallons of gasoline, will enable flight for 2 million miles.

Aircraft experts say that an atomic airplane will have to be larger than the B-36 international bomber to carry the weight of reactors and lead shields required to protect crews from radiation. They say that airplanes will utilize reactors to provide straight jet thrust rather than to turn propellers.

Aircraft Goal Continued

The goal to produce 600 modern transport aircraft for the air carrier industry between Jan. 1, 1950, and June 30, 1955, is being continued, Office of Defense Mobilization announces.

To date, Defense Air Transportation Administration has recom-

mended that ODM issue certificates of necessity for rapid tax amortization covering 367 transports for the air carrier industry.

Chrysler Tank Program O.K.'d

A plan by Chrysler Corp. to stretch out tank production at its Delaware plant has been approved by Army ordnance, Robert T. Keller, Chrysler president, announces.

Tank production was originally planned to end by April, 1954; under the new program, continued operation is assured throughout the year.

Under the program, a tank modification depot now under construction in Newark by Chrysler for the army will be completed and used for storage of suppliers' machine tools. Processing and modification of tanks, previously planned for the depot, will be carried out in the tank plant in conjunction with the stretch-out production.

Bomb-proof Plants Encouraged

Cincinnati Milling Machine Co., Cincinnati, is the first company in the nation to take advantage of the government's new rapid tax amortization plan for "protective construction" of new facilities.

Designed to reduce bomb damage in the event of an attack, the government plan allows 100 per cent fast tax write-off to all plants undertaking such construction on projects costing $25,000 or more in an area listed by civil defense as a "primary target area."

The Cincinnati firm received the first grant to erect a $500,000 facility to produce machine tools, Arthur Flemming, Office of Defense Mobilization head, states. "Protective construction" costs about 20 per cent more than ordinary construction, he reports, "and could reduce major damage by one-third."

In his defense mobilization report to the President, Mr. Flemming expressed concern over the fact that 71 per cent of the nation's industrial capacity and 54 per cent of its workers are located in 50 metropolitan centers of the country.

Mobilization: The Base Grows

Industry has kept pace well with mobilization needs, ODM report to President indicates. Coke-producing expansion and stockpiling programs lag slightly

THE NEEDS of the nation's partial mobilization program have largely been met, but industrial expansion, stockpiling of materials and dispersing of defense facilities should continue.

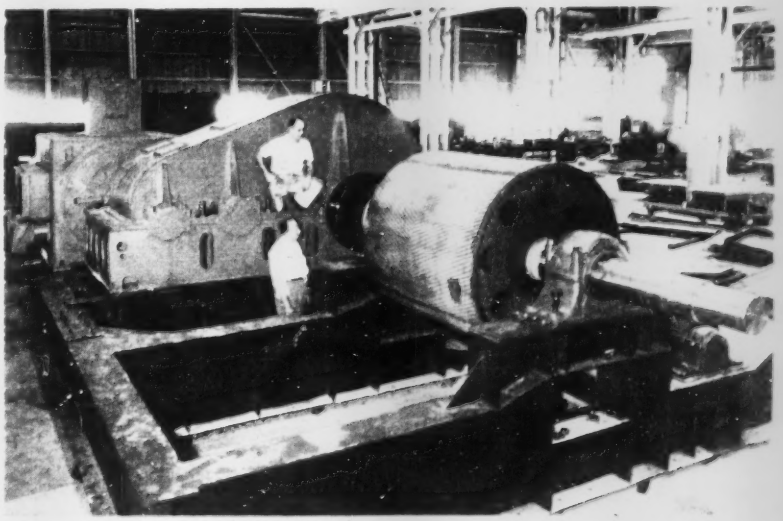
These are the features affecting the metalworking industry outlined in the latest quarterly report on defense mobilization made to President Eisenhower by Arthur S. Flemming, director, Office of Defense Mobilization.

Coke Program Lags — Reports from holders of over 18,000 certificates of necessity for rapid tax amortization show that by the end of 1953 two-thirds of the expansion program should be complete. The steel goal calls for 124.3-million tons annual capacity by 1954, and the expansion has reached about 120 million to date. Domestic primary aluminum capacity goal was set at 1.7 million tons, and capacity is expected to be 1.5 million tons by spring, 1954. Goals not being reached include coke-making facilities. Between 2 and 3-million-tons capacity beyond that presently scheduled will be required to support the blast furnace construction program.

In terms of dollar volume, the nation's stockpiling program is four-fifths complete with $4.2 billion worth of materials on hand and $1.5 billion worth on order. Inventories of 24 of the 76 materials, however, are less than 50 per cent complete and efforts will be made to improve the nation's position with respect to these materials.

Less Vulnerable — Rapid tax amortization is also being used to assist industry to disperse its new facilities and to adopt protective construction rather than ordinary construction.

The ODM program also includes provisions for strengthening the manpower base, measuring the wartime requirements and industrial capacity and working out a system of wage and price stabilization controls which can be adopted quickly in an emergency.



Big Lift for Venezuela

Completely shop-fitted and assembled at the new Link-Belt Co. plant in Colmar, Pa., before shipment to Venezuela, this 1500-hp conveyor drive will become part of an iron ore storage and handling system at Puerto Ordaz. Weighing 58 tons, the drive will power a 60-in. wide inclined belt conveyor having capacity to transport 6700 tons of iron ore per hour from primary crusher to secondary crusher. The assembled drive is about 11 feet high, 19 feet wide and 29 feet long

Windows of Washington

By E. C. KREUTZBERG *Washington Editor*

Rights of the government to contractors' technical information are due for clarification soon, says H. Struve Hensel, new general counsel of the Defense department

LOOK FOR early finalization of Defense department policy on the government's rights to contractors' technical information.

Following much criticism from contractors, the department undertook a thorough review of the matter in the fall of 1951. Its Patent Policy Review Board came up with a proposed revision of Section IX of the Armed Services Procurement Regulation at the end of 1952, followed by a second proposed revision in June of this year.

Tops the List—This now is in the hands of the department's new general counsel, H. Struve Hensel, who has placed it at the top of his worksheet. Mr. Hensel told STEEL that he is making a thorough investigation of Section IX. He will study not only the second proposed revision, but a summary prepared by the board on 15 issues raised by contractors' organizations and not yet resolved.

Mr. Hensel does not expect to hold hearings; however, he expects to call in selected groups of contractors for conferences.

Two Big Objections—While no forecast of Mr. Hensel's final draft can be made at this time, it is of interest that revisions proposed by the Patent Policy Review Board called for the elimination of the much-criticized "Little d" (Subparagraph d, Section IX-107.1) article. The board found that this article was ambiguous and encouraged one-sided interpretations. Both its proposed revisions replaced "Little d" with more explicit language designed to meet the two principal objections of the contractors: Use of the contractors' drawings by foreign industry under the NATO agreement; use of the contractors' drawings to solicit bids from other companies and thus encourage new competition.

The board recommended three new clauses to replace "Little d." One of these covered "Limited Right To Use Information" that is, the usual rights to use technical information for instructional, operational or maintenance purposes. Another covered "Unlimited Use of Information" by the government. The third provided for a mixed arrangement to be reached by negotiation.

Fair and Just—While the nature of Mr. Hensel's decision cannot yet be known, he gives the assurance that the interests of contractors will be given fair and just consideration.

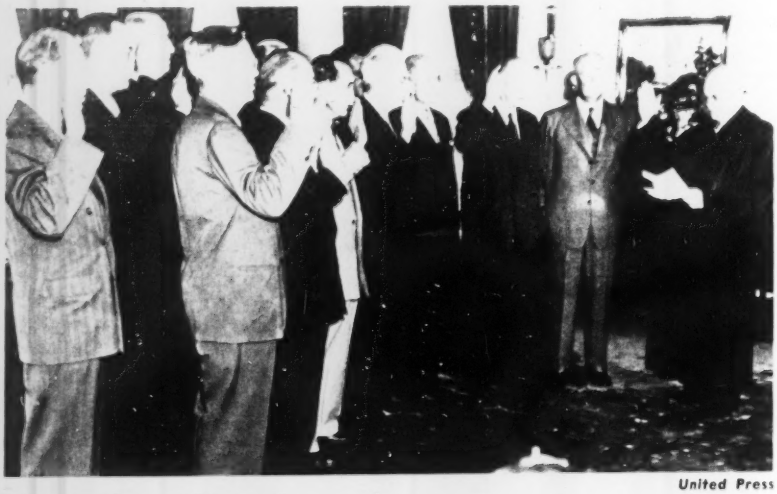
Cure for Fast Spending . . .

Budget Director Joseph Dodge has initiated a drastic cure for the custom of government agencies to spend at the close of the fiscal year the remaining funds in their appropriations.

The director has ordered the Treasury department to subtract the amounts of this overspending from the fiscal 1954 appropriations of these agencies. The total of such overspending, as found to date, comes to $1 billion.

Story of a Holdover . . .

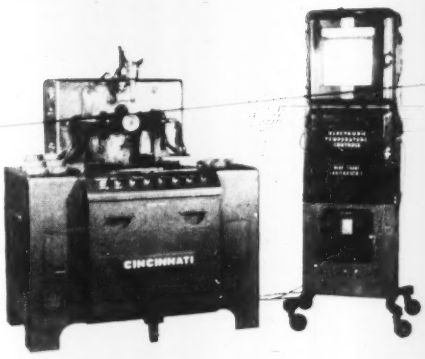
In announcing Secretary McKay's decision to continue "for the present" John J. Forbes as director, Bureau of Mines, many newspapers presented this news as a capitulation to John L. Lewis. What actually happened is that Mr. Lewis came to the secretary and offered his assistance in determining who should fill the post; Mr. Lewis recommended retention of Mr. Forbes. Then came Harry M. Moses, of the Bituminous Coal Operators Association with a similar offer of assistance; he likewise pumped for keeping Mr. Forbes. Subsequently Mr. McKay announced retention of Mr. Forbes, a Truman holdover, subject to later action that he might deem desirable.



United Press

Reorganizers Organize

As President Eisenhower looks on, Supreme Court Justice Harold Burton administers the oath of office to members of the new Federal Commission on the Reorganization of the Executive Branch of the Government. Taking the oath are, left to right, Attorney General Herbert Brownell, Defense Mobilizer Arthur Flemming, James Farley, Dean Solomon C. Hollister of Cornell University, Rep. Chet Holifield (Rep., Calif.), Sen. John L. McClellan (Dem., Ark.), Sen. Homer Ferguson (Rep., Mich.), Dean Robert G. Storey of Southern Methodist University, and chairman of the commission, Herbert Hoover. Hidden in the back row are Rep. Clarence J. Brown (Rep., O.), Joseph P. Kennedy and New York banker Sidney A. Mitchell. Headquarters will be in the GAO building in Washington



yesterday

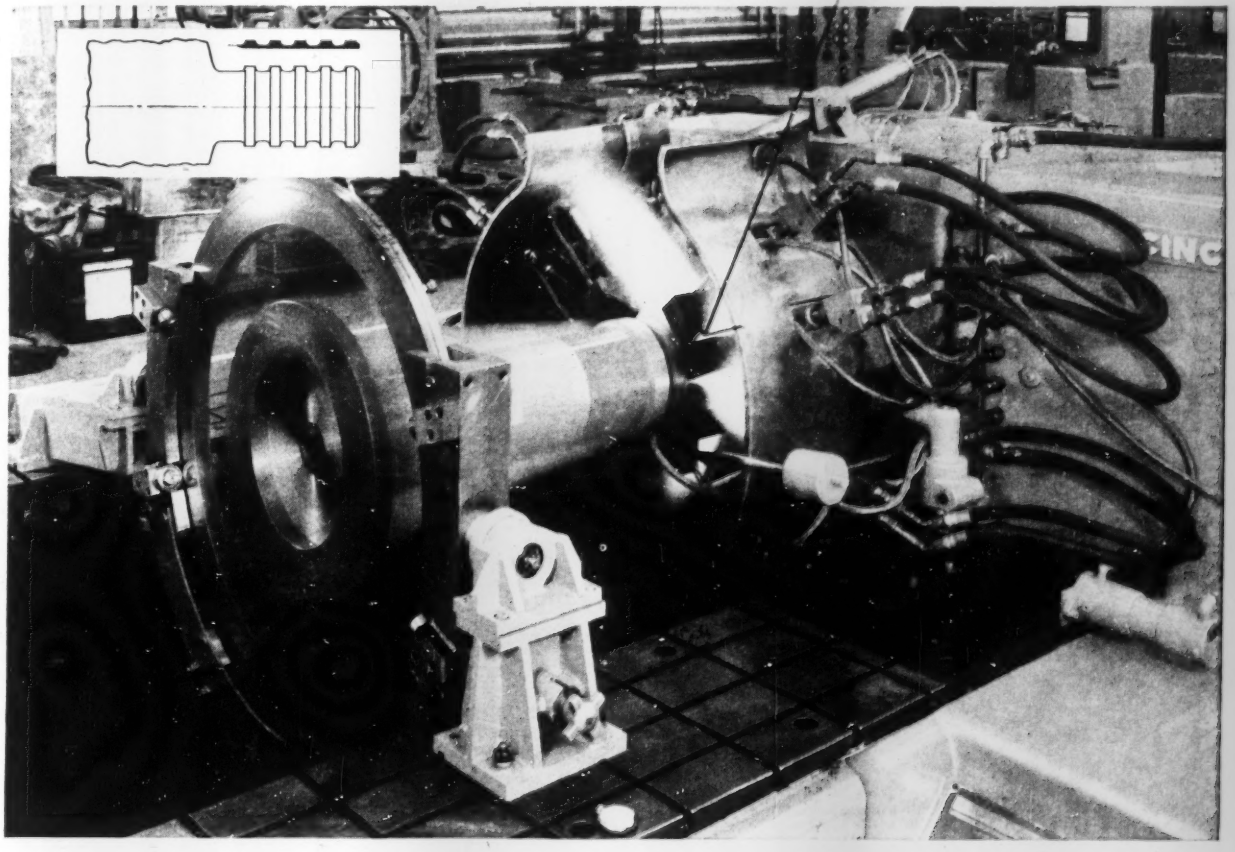
It's a far cry from the working model of the early Cincinnati Flamatic hardening machine shown at left to the "do-the-impossible" machines being run off today in the Flamatic Heat Engineering Laboratory. While the early machine hardened small gears in actual production and (among other things) helped to break a critical bottleneck in production of automatic 90 mm. gun loaders . . .

today

. . . one of Cincinnati's latest Flamatics (below) is hardening ball retention raceways in the assemblies for mounting propeller blades to go on aircraft we can't talk about. Races must be surface hardened to rigid specifications, before bearings are installed in the large assemblies. The work holding fixture by itself is quite a masterpiece. While Flamatics are getting bigger and more versatile, the original principles still apply: concentrate heat, control temperatures and confine hardness.

what's new

in flamatic selective surface hardening



Flamatic's new modern heat engineering lab can handle your heat treat problems from development right through to production. Write for Catalog M-1724.

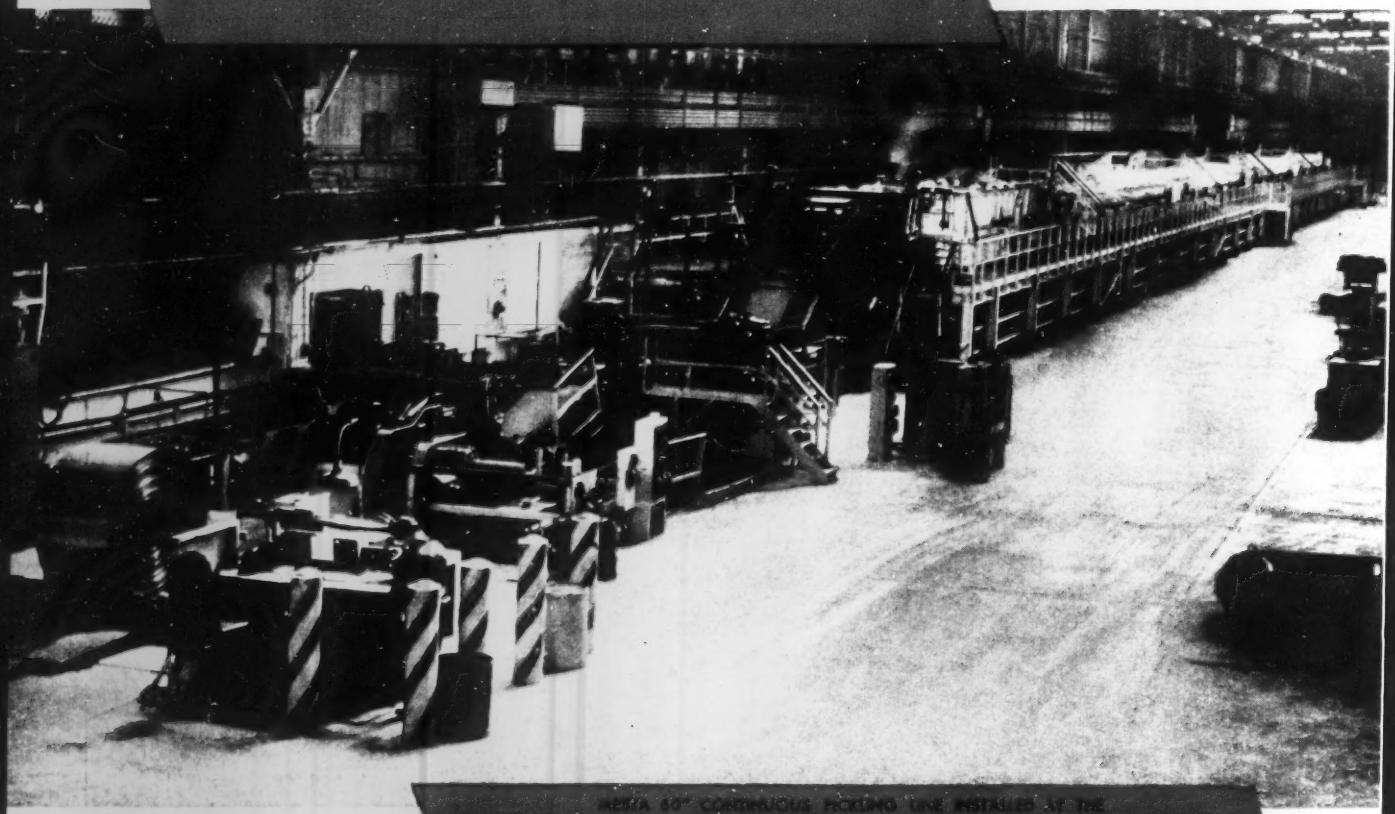
flamatic

THE CINCINNATI MILLING MACHINE CO.

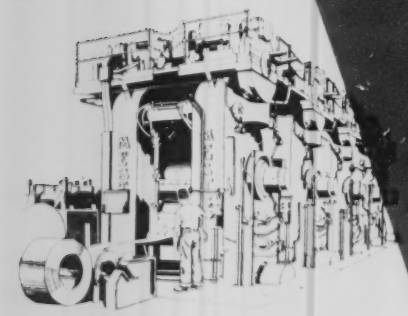
Cincinnati 9, Ohio, U.S.A. • CINCINNATI

MESTA

HIGH-SPEED CONTINUOUS PICKLING LINES



MESTA 60" CONTINUOUS PICKLING LINE INSTALLED AT THE INDIANA HARBOR WORKS OF THE INLAND STEEL COMPANY

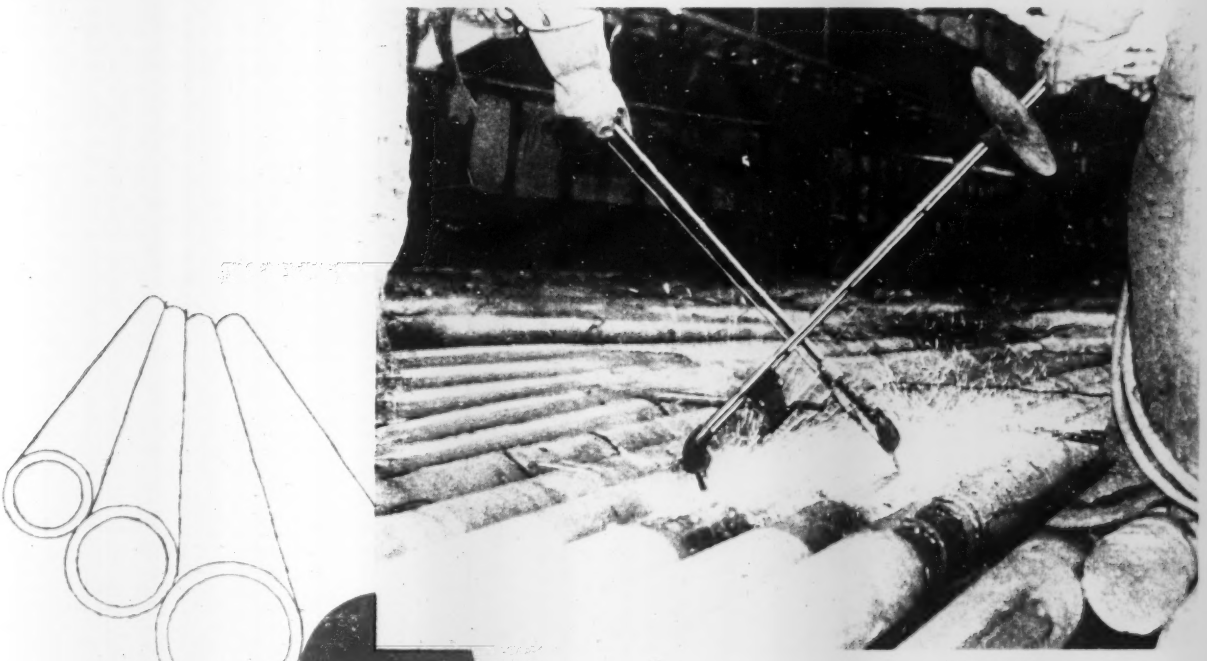


AFTER PICKLING, COILS OF STRIP STEEL ARE COLD ROLLED ON A MESTA HIGH-SPEED TANDEM COLD MILL

Designers and Builders of Complete Steel Plants

MESTA MACHINE COMPANY

Pittsburgh, Pa.



Operators at CF&I's new seamless tube mill use oxyacetylene torches to burn seams, scabs or other defects from surfcce of tube billets before rounds enter the mill. To assure uniform quality, the metallurgy, dimensions and physicals all must be rigidly controlled

New Seamless Mill

ROLLS INTO ACTION

Ready market in oil fields of the West puts CF&I in position to score with new facilities at Pueblo, Colo. They call it "major step" in growth program

THERE'S a new rumble in the Rockies.

It's not the kind that will bring geologists flocking to the scene, but more than a few steelmen are looking to Pueblo, Colo., where Colorado Fuel & Iron Co. rolled the first seamless tube from its new $30-million mill, latest unit in that company's diversification program.

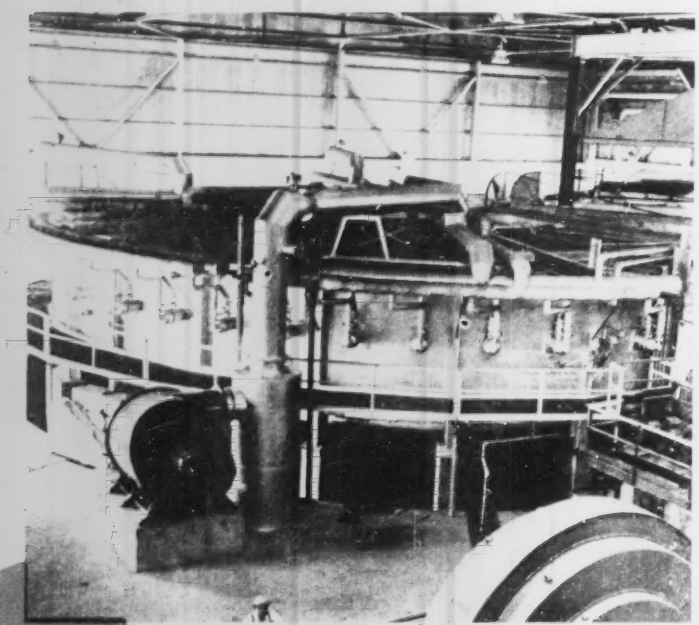
"Completion of this large plant marks an important forward step in the industrial growth of the West," commented Charles Allen Jr., CF&I's chairman of the board. "Seamless pipe produced here will be readily accessible to the great oil and gas fields of the western states and Canada."

Not Surprising—To anyone familiar with CF&I's corporate history of the past decade, this latest step should not come as a surprise. The company has been systematically broadening its sales base with a host of steel products and, at the same time, expanding and modernizing the facilities for producing those products.

Best way to judge how far the company has progressed on its expansion and diversification program is to go back to 1930. At that time, with one steel plant at Pueblo, about 70 per cent of the output went into rails and fastenings. Since then, that total has dropped to 20 per cent of all company sales despite an increase of production and share of the market.

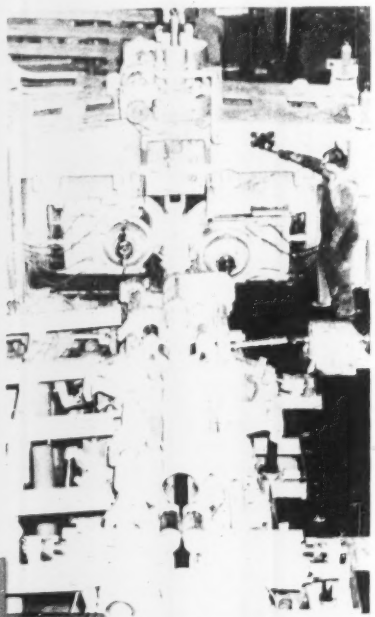
More Products—First step in broadening product range was the acquiring of five eastern plants of the Wickwire Spencer Steel Division whose products include many types of wire, industrial screens, wire rope, screen cloth, springs, etc. Worth Steel Co. plant at Claymont, Del., added carbon steel plates, stainless-clad plates, flanged and dished heads and large diameter transmission pipe. Alloy plates have been added recently.

With the acquisition of Brooke Iron Co. and Richard Ore Co., a very substantial supply of pig iron for the Claymont operation is assured. The latest pur-



HEATING

This 70-foot rotary furnace is one of the largest ever constructed for American industry. Hearth revolves slowly, carrying rounds past the 60 gas jet burners that heat them to 2300 F for piercing



PIERCING

This machine pulls the solid steel round over the piercer, making heavy-walled shell for rolling operation

chase of all facilities of John A. Roebling's Sons Co. completes CF&I's line of wire products, adding cold rolled strip, electrical wire and cable, bridge construction products, new types of wire rope, strand, cords and assemblies and some new special-purpose wire.

Newest Installation—Coming as it does at a time of peak demand for the product, the new seamless tube mill is, in the opinion of CF&I's president, A. F. Franz, "one of the most important of the company's installations." Big oil drilling programs planned for the next several years will pinch even further the short supply of drill casing and tubing.

Within the 10-acre structure is the last word in seamless mill design. When full production is reached the mill will turn out over 150,000 net tons of seamless pipe per year. To insure sufficient steel for the mill, improvements in the Pueblo open hearth shop have stepped up ingot production over 33 per cent.

Rotary Furnace—Tube production starts in the heatup furnace, a 70-foot rotary hearth unit capable of heating 75 tons of round billets to 2300 F every hour. Carefully controlled, uniform heating of billets is vital to the production of quality seamless; this furnace has an electronic control system which tells the operator the condition of each billet as it travels through.

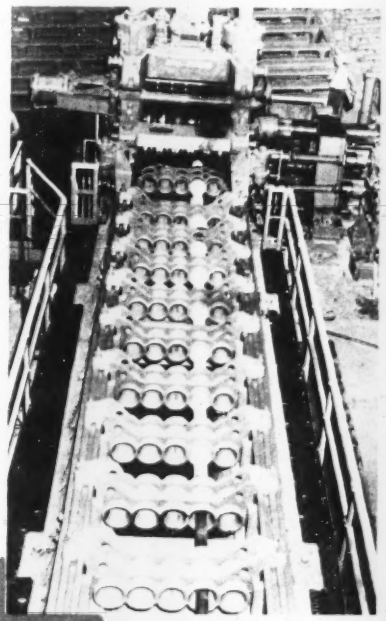
Billets, some of them weighing as much as 2600 pounds, are automatically loaded into the furnace by a hydraulic charging machine and revolved at a predetermined speed through preheat, intermediate and soaking zones. Billet sizes range from 3 to 8½ inches in diameter, from 4 to 16 feet long.

Piercing—When heated to a high forging temperature, billets are automatically discharged and delivered to the center-punching machine which prepares them for the piercing operation. With the point of the piercing cone remaining stationary, the hot billet is actually rolled and pulled around it to form a cylinder. A 3000-hp motor supplies the power.

Pueblo shop is equipped with two piercing mills. Object of double piercing is to permit larger OD and lighter wall thickness than is possible with a single mill. When tubes require double piercing, they must be returned to a rectangular reheating furnace before the next operation rolling.

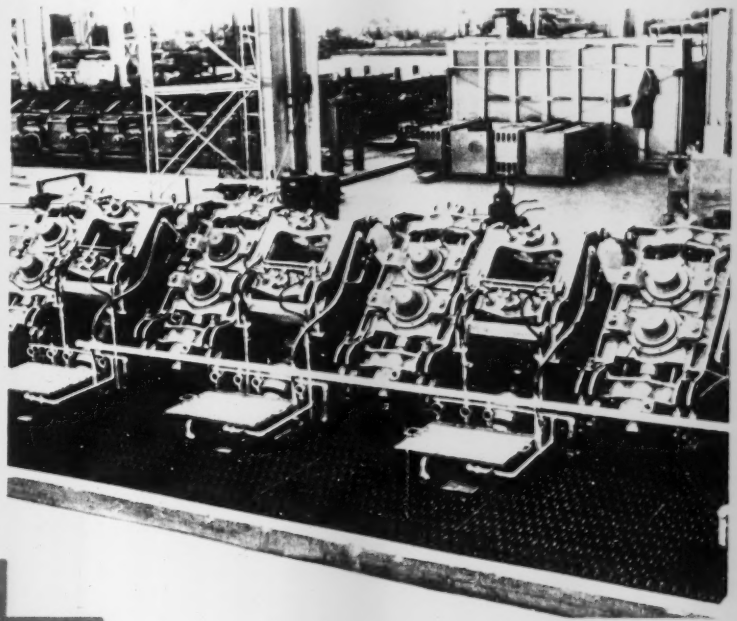
Another Giant—Machine for this step is a 275-ton mill powered by a 1500-hp motor. Red-hot cylinders are pulled through, supported by a plug mandrel from the inside, and subjected to the action of the pressure rolls on the outside. Shell is thus proportionally lengthened and reduced in diameter to desired dimensions.

Next step is to remove light outside and inside scratches in a reeler. This is done by rolling the shell over a plug, this time one that is slightly larger than the shell's inside diameter. Shell becomes a tube fairly straight, burnished inside and out, and rea-



ROLLING

Hollow shell is forced over rolling mill plug, reducing wall thickness and diameter and lengthening shell



SIZING

This seven-stand sizing mill reduces tube to specified outside diameter. Tubes of 4 inches to 9 inches in diameter pass through this mill; smaller ones are processed by a fourteen-stand reducing mill. Finishing follows

sonably round when it leaves this operation.

Sizing and Reducing—Modern practice is to roll tube larger and reduce it to specified size since there is a minimum limit on tube size that can be successfully rolled and reeled. A seven-stand sizing mill or a fourteen-stand reducing mill turn out finished tube sizes at CF&I, choice of mill depending on the size of finished tube.

Tubing then is permitted to cool off on a series of beds before it passes onto the finish floor for final processing. This last operation involves straightening, inspecting, cropping ends, upsetting, threading, final inspection, testing and coating. Next stop: The customer.

Speaking of customers, CF&I President Franz discloses that the company already has a backlog of orders for seamless tubing from the new mill and that peak production will be achieved as quickly as possible.

INSPECTION

Metallurgists inspect the first seamless tubing to be shipped from CF&I's new Pueblo mill. Ground was broken on Feb. 18, 1952. Some 10,000 tons of structural steel and 37,000 cubic yards of concrete went into buildings

for Greater Strength with Lighter Weight in modern material handling equipment

The increasing use of the Evans DF Loader reflects the progress of railroads toward more efficient material handling methods.

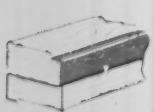
In the DF Loader there is high strength with minimum weight through the use of N-A-X HIGH-TENSILE steel. This low-alloy steel has 50% greater strength than mild carbon steel, with greater resistance to corrosion with either painted or unpainted surfaces.

You can get the same results as Evans. Your product can be made stronger, lighter in weight and longer-lasting, when you specify N-A-X HIGH-TENSILE steel.

N·A·X HIGH-TENSILE STEEL

THE EVANS DF LOADER is a product of Evans Products Co., Plymouth, Mich. DF means Damage-Free, Dunnage-Free.

NAILABLE STEEL FLOORING for boxcars, flatcars and gondolas is made of N-A-X HIGH TENSILE steel, and is a product of Steel Floor Division, Great Lakes Steel Corporation.



Engineering data on these products available upon request to the manufacturers.

The "Wonder Bar," a section of which is shown at left, is a vital part of the Evans DF Loader. It is a wooden bar reinforced by a Z-bar made of N-A-X HIGH-TENSILE.

The "Wonder Bar," when locked into place, secures all kinds of lading. It is strong enough to resist shifting load stresses in moving boxcars, yet so light that one man can lift it into position. The DF Loader provides real operating economies for both railroads and shippers.

Another modern product for efficient transportation equipment is Nailable Steel Flooring, also made of N-A-X HIGH-TENSILE steel.

GREAT LAKES STEEL CORPORATION

N-A-X Alloy Division — Ecorse, Detroit 29, Mich.

NATIONAL STEEL CORPORATION

By FLOYD G. LAWRENCE *Detroit Editor*

Mirrors of Motordom

It's annual prediction time for automakers as new models come forth. Consensus: "Total 1954 production may drop 10 per cent, but output of our car will buck the trend"

DETROIT

MODEL CHANGEOVER applies as much to the thinking of the automakers as to physical plant revision. As production of 1954 models begins and dealers unceremoniously dump the remaining 1953 stock, advertising and publicity men realize that miraculously the 1954 line is what the world has really been waiting for all along.

New model introduction is manifestly the start of the new year for the auto companies. With the glint of broad new vistas in their eyes, otherwise sober sales executives come forth with predictions about each new model in their line, the auto industry, the economy in general and the U. N.'s course.

Good Hearing—Because these men are associated with the largest manufacturing industry in the nation, their opinions are listened to carefully. Perhaps they are listened to more carefully than they were formed.

The auto companies employ large research staffs. These staffs assess such variables as consumer credit levels, dealer stocks and so on up to 5000 individual items in some cases. Each of these items is important and has a bearing on the matter, but each must be weighted according to its relative significance.

The Way of Weighting—Weighting is the first bit of skulduggery in the science, for not only does opinion vary greatly on what is the appropriate weighting for a given factor, but also the weighting can change suddenly and radically. And when all of the factors have been properly assessed, the resultant configuration of the economy is something which has never precisely existed before.

The configuration, which is new, is then viewed in terms of models which are new and translated by a method verging on the occult into active market demand. It all adds up to an interesting but questionable mixture of how many people *can* vs. how many people *will* buy new cars in 1954. And the whole deal is haunted by the specter of consumer psychology which can go blooey overnight.

Off the Cuff—Enter the final bit of unreliability. In the face of all this and the fact that each auto company jealously guards its formula with the explicable shortcomings, the sales manager often just makes up a figure right smack dab out of his head which will: A. confuse his competitors, and B. help sustain the optimism of the buying public in the economy.

Estimates of passenger car production ranging from 5 to 6 million units have already been published. It is possible that this estimated drop of 10 to 20 per cent in auto production next year is correct. On the other hand, it can be just as incorrect as were the pessimistic estimates in 1949 prior to the 1950 record 6.6 million output.

Yes and No—A good case can be made for increased auto sales in 1954 though no one has yet troubled to do so. The cut in personal income tax could pose an as yet incalculable sales stimulant. Any increase in government spending due to changing conditions in unstable Korea could increase consumer confidence. And the increase in sales effort planned by many firms can do much to bring the hesitant to the cash register.

The automakers' predictions of 1954 output make interesting reading and cater to a desire to fathom the future. But the automakers making those statements are at the same time carefully bolstering their sales organizations and examining cost schedules to be sure their position will be competitive. Their action should speak more loudly to industry than their words.

New Dodging Dodges

The Dodge was an extremely swift scooter in 1953, but the 1954 jobs, which just finished hanging up 196 new AAA stock car records including a top speed of 108.36 mph at Bonneville, bid fair to top the crop.

Though the exteriors have been only excitingly facelifted, the interiors are all new color-matched outfits that glisten like a new drive-in. The Red Ram V-8 now has 150 hp available on Coronet

Dodge Introduces a Sporty Coupe

Identification changes are plentiful on the 1954 Dodge cars, but basically the new models remain about the same as this year's. Grille, tail lights, headlights, wheel covers and side molding are restyled. The Royal V-8 hardtop sport coupe, above, has fully-automatic transmission, Red Ram engine stepped up to 150 horsepower and power steering. First public showing was Oct. 8

Sniffing Out Secrets

Ford Motor Co. engineers learn fuel distribution secrets from special valves inserted in engine sparkplug holes to sample exhaust gases

and Royal models. The Red Ram with only 140 hp is now available on Meadowbrook models, while the Get-away Six has been hiked to 140 hp and is available on Meadowbrooks and Coronets.

But perhaps the most notable performance feature of the 1954 Dodges is the addition of Powerflite transmission available on the Coronet and Royal models. Coupled with the Red Ram which had trouble getting a foothold on the Gyromatic and Gyro-torque units, Powerflite offers a high degree of performance while retaining a high degree of smoothness as well.

A brief test drive in this new combination, together with new power steering and the intelligent 16-to-1 steering ratio utilized with the device, indicates that the Dodge transformation of character begun last year is complete. The 1954 Dodge should prove to be one of the hottest things on the road, and conceivably the regular clergyman's discount will now be extended to stock car pilots as well.

The MG Gets Styling

Word arrives this week that a new MG, model TF, will be arriving on the scene early next year. The degree of difference is comparable to that in the transformation of the TC to the TD in 1950 and in the same direction of further streamlining.

The front fenders extend relatively straight across to the sides of the hood rather than curving down to the chassis. The headlights, similar in shape to those of the Jaguar, are mounted on this new expanse of fender. The grill is nearer the front bumper curving back though retaining approximately the same rectangular outline, while the sides of the hood no longer open due to the fender redesign. Instead the tops of the hood open with push buttons.

Rear fenders on the MG TF extend back further than those on the TD and the side silhouette of the car is somewhat similar to the SS-100 Jaguar. Displacement of the engine remains at 1250 cc.

Interiors will feature two individual bucket seats, a new centrally located instrument group similar to that of the Jaguar.

Coming as it does on the heels of the announced price cuts by Jaguar running up to $889 on the XK-120 roadster and the impending introduction of the Austin-Healy in quantity, the implications are that the British motor makers are in a bit of a dither over the American market. With foreign car sales up 19 per cent thus far over 1952, at 19,079, and MG leading the field, the Abingdon-On-Thames group is throwing in style to strengthen its lead. Now if they'd just give us some performance.

To Amaze Your Friends

Some highly interesting items of information with which you may wish to amaze your friends are included in the new Automobile Manufacturers Association booklet, *Automobile Facts and Figures*.

Among them are the following:

American cars, trucks and busses are traveling more than half a trillion miles a year, with about 28 per cent of the vehicles built 11 years or more ago.

This year motor vehicle registrations will reach an estimated 54.7 million in the U. S.

About one in 36 passenger cars were prewar models in 1952 compared to only about one in eight motor vehicles in the 10-years-or-older class in 1941.

Taxes took 29 cents out of the auto sales dollar in 1952 compared with 14 cents in 1939.

More than 75 per cent of the world's passenger cars are in the U. S., sufficient to carry our entire population at one time and still have enough room left over for the population of Italy.

The wholesale value of motor vehicles built in the U. S. last year was $8.7 billion. Replacement parts and accessories had a value of more than $2 billion and automotive retailer sales totaled $38 billion.

Auto, Truck Output

U. S. and Canada

	1953	1952
January	612,815	424,559
February	623,793	464,577
March	752,474	525,024
April	782,453	570,464
May	685,390	542,559
June	713,206	542,479
July	757,595	226,134
August	641,242	322,755
September		595,715
October		656,767
November		548,782
December		569,715
Total		5,989,509
Week Ended	1953	1952
Sept. 5	132,574	111,095
Sept. 12	122,863	137,295
Sept. 19	146,912	147,748
Sept. 26	140,953	141,228
Oct. 3	140,138	143,234
Oct. 10	141,000*	138,035

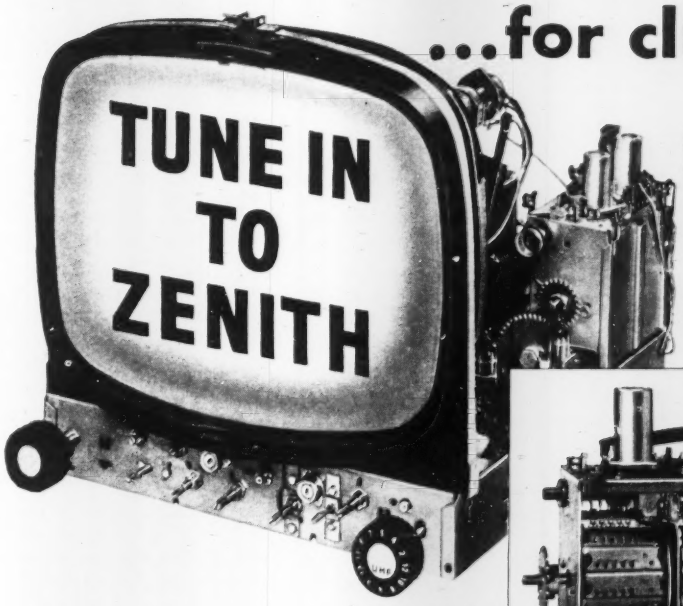
Source: Ward's Automotive Reports.
*Estimated by STEEL

Exhaust Notes

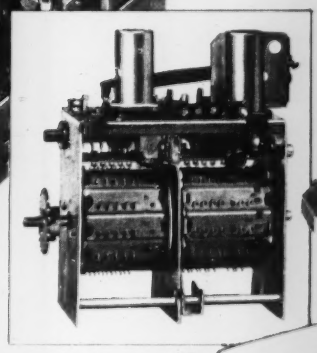
Powerflite transmission production is now reported at 700 units per day at Chrysler's Indianapolis plant.

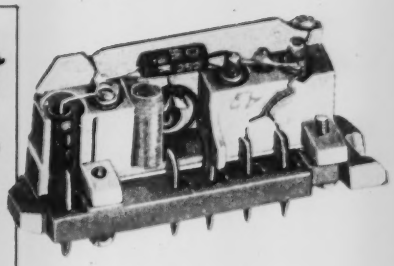
Volkswagen, German auto firm, recently eyed the possibility of building a plant in Canada. Officials concluded it is cheaper to deliver the assembled car, including 17 per cent import duty, than to build the plant, and the plan was abandoned.

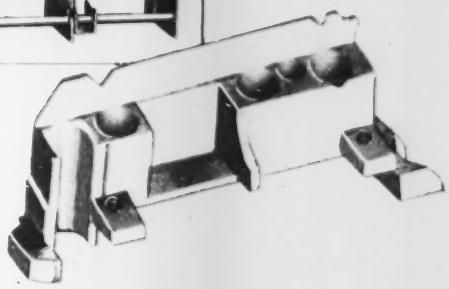
Packard production of 1953 models is nearing completion with an output increase of approximately 50 per cent over 1952 output. New models will go into production when tooling, delayed by a Detroit strike, is completed. Public display is scheduled for January.



...for clues to get the mo$t for your Zinc Die Ca$ting Dollar!







The biggest savings achieved by the die casting process are not always found in the biggest castings. At the right you see a ZINC Die Casting measuring only 2⅛ inches long but embodying king-sized economies. Die casting is the only economically feasible method of producing this part in one piece, *and ZINC is the best-suited metal.* It is a tuner strip frame used in converting existing Zenith TV Turret Tuners from VHF (very high frequency) to UHF (ultra-high frequency). A separate strip is used for each channel.

Only two simple reaming and tapping operations are required to prepare this complex ZINC Die Casting for assembly. The die caster, working closely with Zenith engineers, incorporated in the casting all of the openings, recesses and holes required for the assembly of the delicate "innards" of the tuner strip.* The design is one which calls for irregular distribution of metal from feather edges to heavy mounting sections—all with extremely close tolerances. *The unusual castability of ZINC alloy makes this the preferred metal for such die casting applications.*

Many other current examples of die casting economies can be found in our new booklet "The End Uses of Zinc Die Castings." Ask us—or any commercial die casting company—for a copy.

Send for your copy

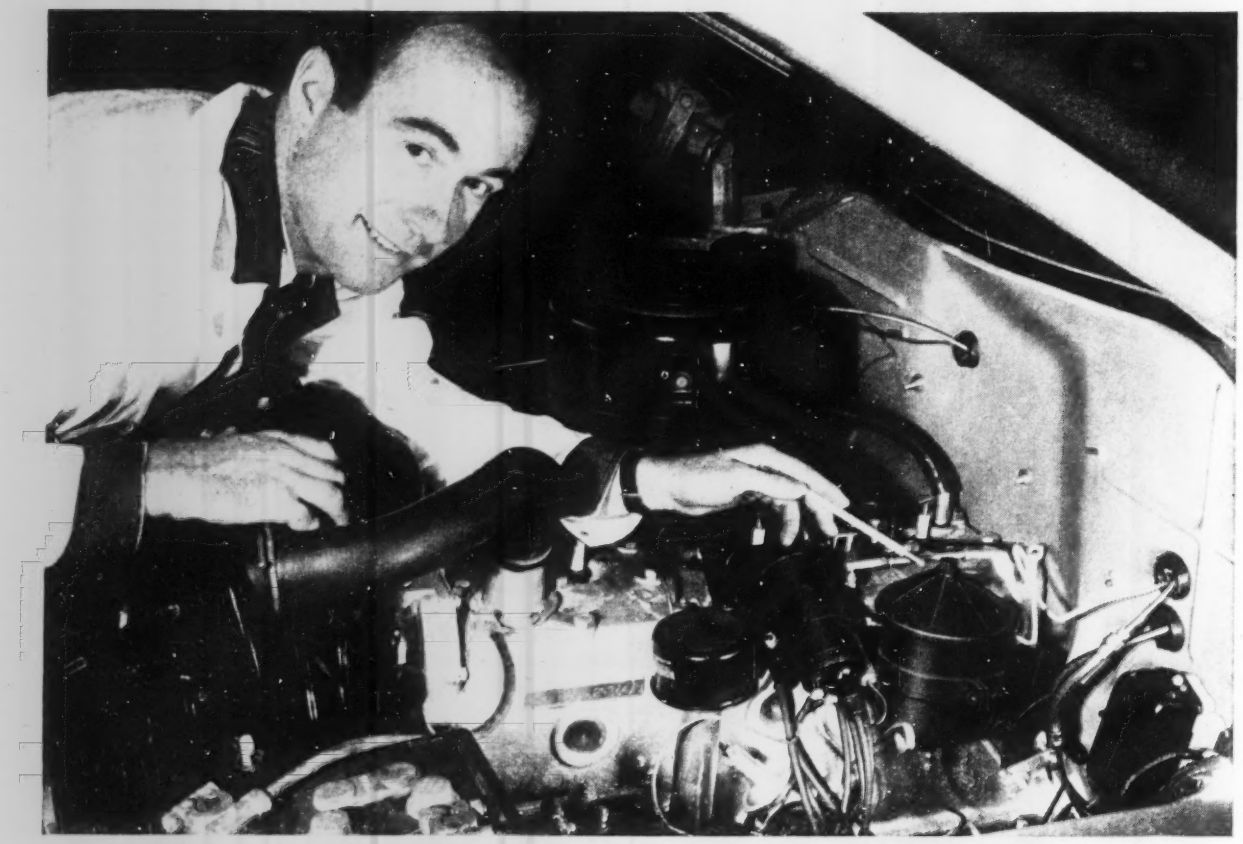
** The casting is silver plated to facilitate the soldering of the many wires used in the assembly.*

The New Jersey Zinc Company
160 Front St., New York 38, N. Y.

ZINC
FOR DIE CASTING ALLOYS

The Research was done, the Alloys were developed, and most Die Castings are based on

HORSE HEAD SPECIAL (99.99 + % Uniform Quality) ZINC



Here's where Purolator screened out rising costs

● Purolator makes oil filters for a prominent auto maker. They're top-notch filters that do a tough job well. Purolator and the car manufacturer are both proud of them.

Not long ago an RB&W "fastener engineer" got loose in the Purolator plant—just when company production executives were looking for a way to lick rising costs. He noticed that the Purolator filter was being assembled with a two-piece fastener made slowly and laboriously on a screw machine.

Our man told the Purolator people about RB&W's batteries of cold-forming machines. Purolator wanted to know more. Now their filter is assembled with a one-piece RB&W fastener that costs far less to make and assemble.

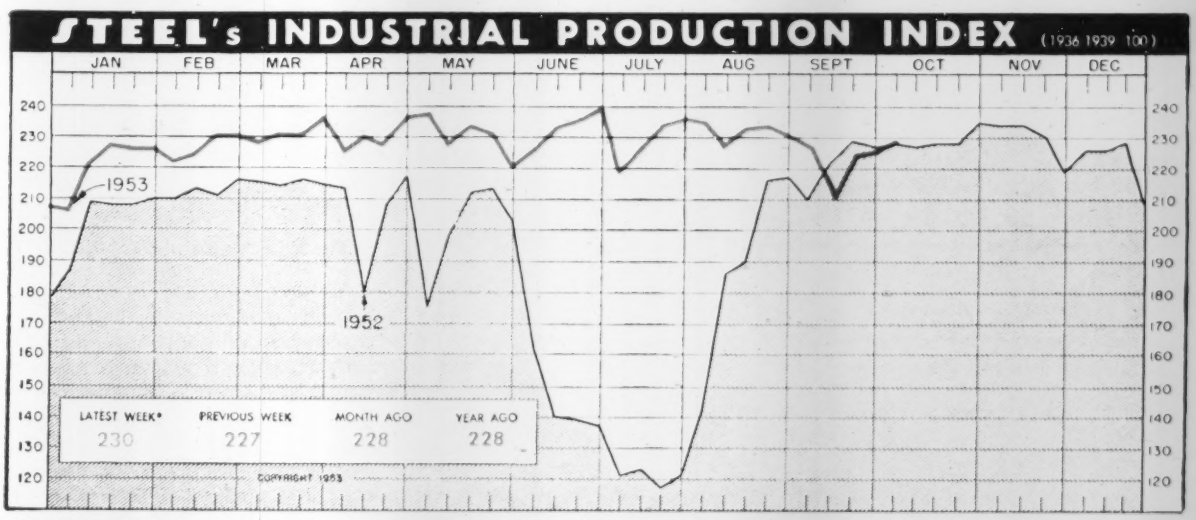
Chances are you can find a stage in your operations where RB&W "fastener engineering" can help you keep costs in line. As a leading manufacturer of all kinds of fasteners, we're always able to recommend and supply the right ones for all your needs. Write RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY, Port Chester, N. Y.

EASIER, FASTER ASSEMBLY undercut high costs when Purolator switched from a two-piece fastener *(right)* to an RB&W-designed cold-formed fastener *(left)* for its famous oil filter.

RB&W

108 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG

Plants at: PORT CHESTER, N. Y., CORAOPOLIS, PA., ROCK FALLS, ILL., LOS ANGELES, CALIF. *Additional sales offices at:* PHILADELPHIA, PITTSBURGH, DETROIT, CHICAGO, DALLAS, SAN FRANCISCO. *Sales agents at:* PORTLAND, SEATTLE. *Distributors from coast to coast.*



*Week ended Oct. 3

Based upon and weighted as follows: Steelworks Operations 35%; Electric Power Output 23%; Freight Car Loadings 22%; and Automotive Assemblies (Wards' Reports) 20%.

The slight slowdown in business is being met in a healthy manner. No one's getting hysterical. Nearly everyone welcomes the respite from a hectic pace

THERE'S an encouraging and wholesome air about the way people are meeting the mild slowdown in business. They're keeping their shirts on, so to speak. If they keep them on they won't lose them.

The slowdown, being only moderate, is not being looked upon hysterically. It was not unexpected, and it generally is welcomed as relief from a hectic pace.

Even with the slowdown, business and industry are at a good level. Almost everyone businessmen and the government is on the alert to take measures to prevent any sudden and drastic plunge in business and industrial activity. Business and industry are intensifying their sales efforts, and the government, in its flexible money policy, is maneuvering interest rates downward to encourage business to borrow what money it needs to keep things spinning.

As long as everyone's trying to do something about business instead of just talking about it, there's reason for confidence.

Production Rate High . . .

Reflecting the high level at which industrial activity is rolling along, STEEL's industrial production index in the week ended Oct. 3 registered a preliminary 230 per cent of the 1936-1939 average. This is 11 points below the all-time high set at the end of June but is 2 or 3 points above what prevailed in the last month and a year ago.

The lower level of industrial activity in September, compared with August, is mirrored by the Federal Reserve Board's industrial production index, which for September is estimated at 234 per cent of the 1935-1939 average, compared with August's 236 per cent. The decline in September results mainly from an easing in some durable goods industries.

Expansion Planned . . .

While indicators show a general tightening-up, business is still very good, says the business survey committee of the Purchasing Agents Association of Chicago. Reflecting continued confidence in the future, 35 per cent of the companies surveyed plan to expand their fixed investment and production equipment early in 1954. Sixty-one per cent feel that fixed investment will remain unchanged. Only 4 per cent reported that their purchasing plans point to a reduction in plant and equipment.

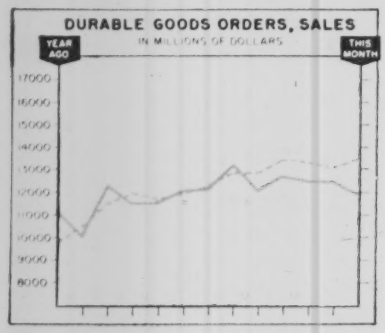
Steel Output Stays High . . .

One of the big wheels in the present level of industrial production is steel output. It is running along at around 95 per cent of capacity. While that is not as high as it was earlier in the year when capacity operations were common it is an excellent performance, considering that the steel industry's capacity is larger now than at the start of the year.

The American Iron & Steel Institute points out that more steel is made now in a week at 95 per cent of the national steelmaking capacity (as rated at the start of this year) than when the rate was 100 per cent of capacity as rated at the beginning of 1952.

While the weekly figure showing the per cent of capacity operated is widely watched as an economic barometer, the figures showing the tons of steel made are most important, the institute asserts. Now, at only 88 per cent of capacity, more steel can be made than in the most active week of 1950 when steelmaking furnaces were operated at 100 per cent of that year's capacity, the institute points out.

Output in the week ended Oct. 10 was expected to be about the same as in the preceding week 2,132,-

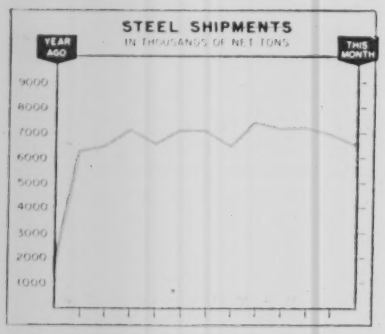


Durable Goods Orders, Sales

In Millions of Dollars*

	New Orders		Sales	
	1953	1952	1953	1952
Jan.	12,050	11,142	12,156	10,561
Feb.	13,138	11,419	12,825	11,352
Mar.	12,023	12,171	12,521	10,632
Apr.	12,621	12,443	13,190	11,310
May	12,441	10,956	13,235	11,328
June	12,456	13,135	13,016	10,960
July	11,921	11,140	13,448	9,777
Aug.		9,908		10,437
Sept.		12,325		11,510
Oct.		11,462		11,565
Nov.		11,441		11,676
Dec.		12,011		11,913

*Seasonally adjusted. U. S. Bureau of Business Economics

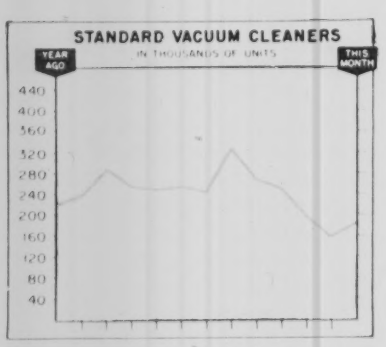


Steel Shipments

Net Tons

	1953	1952	1951
Jan.	7,067,636	6,589,161	6,901,688
Feb.	6,643,227	6,358,263	5,776,229
Mar.	7,436,919	6,500,391	7,106,078
Apr.	7,162,160	6,922,174	6,631,410
May	7,209,206	6,947,450	6,938,708
June	6,560,658	1,250,243	6,643,597
July	6,582,614	1,413,672	6,988,574
Aug.		6,312,118	6,756,589
Sept.		6,542,147	6,207,491
Oct.		7,155,611	6,811,093
Nov.		6,647,726	6,509,018
Dec.		7,196,382	6,411,165

American Iron & Steel Institute

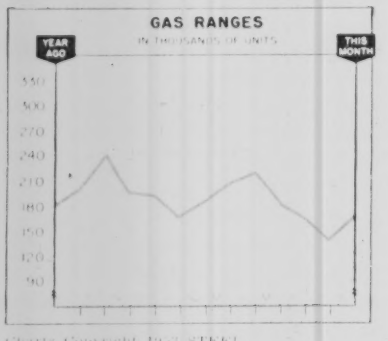


Standard Vacuum Cleaners

Sales Billed, Units

	1953	1952	1951
Jan.	250,886	223,347	282,304
Feb.	246,007	230,226	261,472
Mar.	329,291	290,092	299,242
Apr.	295,548	247,164	257,216
May	242,104	216,964	201,983
June	197,506	206,928	194,548
July	159,146	188,216	161,902
Aug.	158,029	222,413	191,299
Sept.		237,411	210,086
Oct.		292,474	250,169
Nov.		264,297	219,919
Dec.		239,032	230,263
Total		2,811,593	2,729,104

Vacuum Cleaner Mfrs. Assn.



Gas Ranges

Shipments in Units

	1953	1952	1951
Jan.	169,200	166,100	260,600
Feb.	185,500	169,200	234,000
Mar.	208,200	183,200	289,800
Apr.	220,300	182,300	225,000
May	181,000	162,800	177,800
June	160,600	175,700	128,500
July	147,700	151,200	116,400
Aug.	165,500	178,600	168,100
Sept.		165,600	183,600
Oct.		229,700	210,600
Nov.		180,400	192,200
Dec.		178,600	119,500
Total		2,173,400	2,356,100

Gas Appliance Mfrs. Assn.

Charts Copyright 1953 STEEL

Issue Dates on other FACTS and FIGURES Published by STEEL

Construction	Oct. 5	Gray Iron Castings	Sept. 7	Radio, TV	Aug. 31
Employ., Metalwk.	Sept. 28	Indus. Production	Sept. 14	Ranges, Elec.	Oct. 5
Employ., Steel	Aug. 31	Ironers	Sept. 21	Refrigerators	Oct. 5
Fab. Struc. Steel	Sept. 21	Machine Tools	Oct. 5	Steel Castings	July 20
Foundry Equip.	Sept. 14	Malleable Castings	Sept. 7	Steel Forgings	July 20
Freight Cars	Aug. 24	Prices, Consumer	Sept. 28	Wages, Metalwk.	Sept. 28
Furnaces, Indus.	Sept. 14	Prices, Wholesale	Sept. 28	Washers	Sept. 21
Gears	Sept. 21	Pumps	Aug. 24	Water Heaters	Sept. 14

000 net tons of steel for ingots and castings.

Aware that demand for steel is abating, the steel industry is girding itself for intensified competition. A number of the steel producers proclaimed publicly that when necessary and desirable to get business they will pay some of the costs of delivering steel to the buyer, instead of leaving the buyer to pay all the freight.

Autos Roll Along . . .

Another big wheel in the industrial machine today is the automotive industry. While its output is not as high as it was earlier in the year it still is at respectable levels.

In the week ended Oct. 3, production of passenger cars and trucks in the U. S. and Canada totaled a preliminary 140,138 units, says *Ward's Automotive Reports*. Revised total for the preceding week was 140,953. Including Canadian output, 6,234,621 passenger cars and trucks had been built this year through Oct. 3, compared with only 4,287,655 units in the comparable period of last year, which was hurt by the steel strike.

Output of passenger autos in October is projected at 14 per cent over the September rate.

Electrified . . .

The good pace of industry and the trend toward increased use of electricity is keeping the output of electrical energy 8 or 9 per cent above comparable year-ago levels.

Standing out because of increases in electricity consumption is the southeast district of the nation. Since early in the summer that district's use of electricity has been 20 per cent over year-ago levels.

Watch Retail Sales . . .

As long as retail sales remain high there'll be a good level of activity clear back into the factories, for two-thirds of all expenditures are for personal consumption. In 1952 when the gross national product was $348 billion, personal consumption expenditures accounted for $218.1 billion of it.

Department store sales one indicator of retail sales as a whole

BAROMETERS OF BUSINESS

	LATEST PERIOD	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Output (per cent of capacity)[2]	95.0	94.5	103.5
Electric Power Distributed (million kwhr)	8,414	8,354	7,665
Bitum. Coal Output (daily av.—1000 tons)	1,604	1,611	1,672
Petroleum Production (daily av.—1000 bbl)	6,478[1]	6,486	6,514
Construction Volume (ENR—millions)	$382.6	$341.2	$234.3
Automobile, Truck Output (Ward's—units)	140,138	140,953	143,234
TRADE			
Freight Car Loadings (unit—1000 cars)	824[1]	820	852
Business Failures (Dun & Bradstreet, no.)	189	152	129
Currency in Circulation (millions)[3]	$30,271	$30,210	$29,417
Dept. Store Sales (changes from year ago)[4]	+3%	+6%	+5%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$18,081	$19,784	$17,279
Federal Gross Debt (billions)	$272.9	$272.4	$262.4
Bond Volume, NYSE (millions)	$13.3	$12.5	$16.1
Stocks Sales, NYSE (thousands of shares)	5,106	5,538	5,178
Loans and Investments (billions)[4]	$78.9	$79.5	$75.5
U. S. Gov't. Obligations Held (billions)[4]	$31.4	$31.6	$31.7
PRICES			
STEEL's Finished Steel Price Index[5]	189.38	189.38	181.31
STEEL's Nonferrous Metal Price Index[6]	204.8	204.3	221.0
All Commodities[7]	110.6	110.7	111.8
Commodities Other Than Farm & Foods[7]	114.6	114.6	113.2

[1]Dates on request. [2]Preliminary. [3]Weekly capacities, net tons: 1953, 2,254,420; 1952, 2,077,010. [4]Federal Reserve Board. [5]Member banks, Federal Reserve System. [6]1935-1939=100. [7]1926-1939=100. [8]Bureau of Labor Statistics Index, 1947-1949=100.

were good enough in the week ended Sept. 26 to exceed the dollar volume of the comparable week of last year by 3 per cent. In the four weeks ended Sept. 26, department store sales were unchanged in dollar volume from the corresponding period of 1952. However, sales this year through Sept. 26 exceeded those of the same period of last year by 3 per cent.

Personal Income Declines . . .

Although retail sales were at a pretty good level in September, it's a safe conclusion that consumers had less to spend than in August.

Personal income in August was at an annual rate of $287 billion, half a billion less than in July. And because industrial activity in September was not as brisk as it was in August, personal income undoubtedly declined.

In August, private industry payrolls, at an annual rate of $167 billion, were about a half a billion lower than in July. This decline was largely in durable goods.

Workweek Levels Off . . .

Putting the brakes on personal income is a tendency toward fewer hours in the factory workweek. Where there's ordinarily a seasonal increase in the factory workweek between July and August there was none this year, the U. S. Bureau of Labor Statistics reports. The August workweek in manufacturing this year was 40.5 hours.

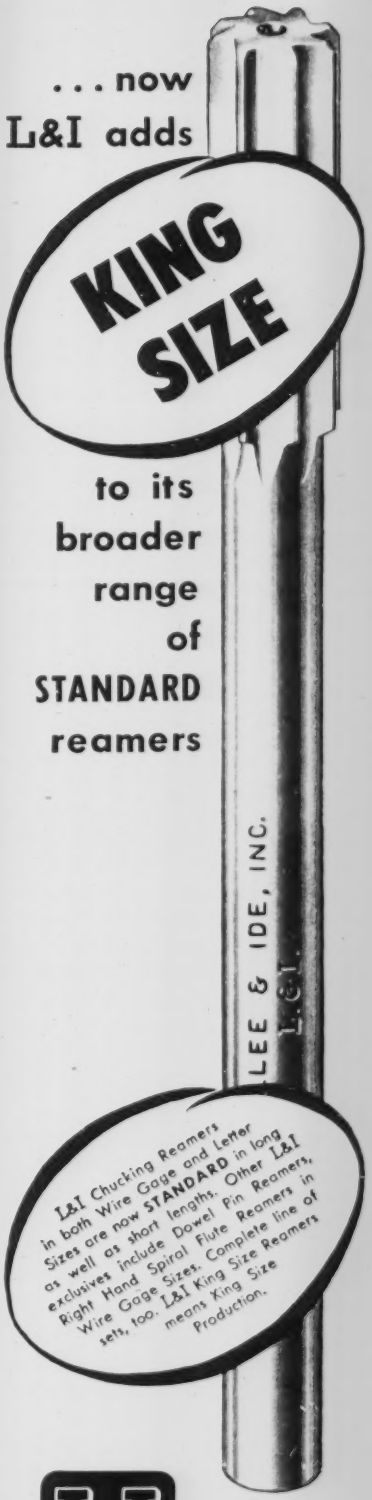
Consumer Credit Rises . . .

With sales running pretty high and workweeks leveling off it's not surprising that consumer installment credit in August rose $217 million over the preceding month. At the end of August, total consumer credit was $27,434 million, the Federal Reserve Board says. Most of the increase was in loans for automobiles.

Trends Fore and Aft . . .

Launching of new businesses dropped sharply in August to 7487 from July's 8703 . . . August production of radio and television sets (603,760 TVs and 991,637 radios) was at the highest level for that month since 1950 . . . Shipments of gas-fired central heating equipment in August totaled 81,000 units, 2.2 per cent less than in the corresponding month of last year . . . Freight car loadings in the fourth quarter of 1953 are expected to be on about the same level as in the comparable period of 1952.

. . . now L&I adds KING SIZE to its broader range of STANDARD reamers



L&I Chucking Reamers in both Wire Gage and Letter Sizes are now STANDARD in long as well as short lengths. Other L&I exclusives include Dowel Pin Reamers, Right Hand Spiral Flute Reamers in Wire Gage Sizes. Complete line of sets, too. L&I King Size Reamers means King Size Production.

L&I The Reamer Specialists

LAVALLEE & IDE, INC.
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HANDLE ALL YOUR EMULSIFYING CUTTING OIL NEEDS with S.E.C.O. and S.E.C.O. HD "F"

Sunoco Emulsifying Cutting Oil — For general-purpose cutting and grinding. This product is more widely used in metal-working plants than any similar oil. It has high emulsion stability and cooling efficiency, excellent lubricating and rustproofing characteristics. Those features, plus low initial cost, make S.E.C.O. ideal for a wide range of machining, grinding and rolling operations on both ferrous and nonferrous metals.

Sunoco Emulsifying Cutting Oil HD "F" — For heavy duty cutting. Its extreme pressure properties give it a film strength more than twice that of regular emulsifying oils. This high film strength, plus increased "oiliness" characteristics, makes it ideal for machining jobs too tough for regular soluble oils and too hot for straight cutting oils. Emulsions of S.E.C.O. HD "F" are clean smelling and will remain so in service.

For complete data on S.E.C.O. and S.E.C.O. HD "F," call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. S-10.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

SUNOCO

PHILADELPHIA 3, PA. ◆ SUN OIL COMPANY LTD., TORONTO & MONTREAL

Men of Industry

ERNST F. KLESSIG
. . . Airway Products engineering dir.

DONALD J. SHAUGHNESSY
. . . new post at Pittsburgh Steel

WILLIAM M. FRAME
. . . National Tube's research dir.

Airway Products Inc., Pontiac, Mich., appointed **Ernst F. Klessig** director of engineering. For the last 17 years he has been with Vickers Inc. where he was executive design engineer.

Harry P. Troendly was elected president of the Spring Division, **Borg-Warner Corp.**, Chicago. Since founding of the division 13 years ago he has been vice president and general manager. He now succeeds **David E. Gamble**, retired. New vice presidents are **M. O. Gillett**, factory manager, and **Arthur J. Welch**, sales manager, Spring Division. **James Niblick**, previously office manager and assistant comptroller, was named assistant secretary, assistant treasurer and comptroller.

John S. Carr was made manager of pump sales for **American Manganese Steel Division**, American Brake Shoe Co., New York. He will be located at the Amsco plant in Chicago Heights, Ill. Formerly a sales engineer, he has been with the company since 1949.

E. W. Bliss Co., Canton, O., announces **Howard K. Segerlind** has joined its can machinery sales office in New York. He formerly served Bliss for six years as an engineer specializing in can machinery.

Donald J. Shaughnessy fills the newly created position of administrative assistant-production and scheduling at the Monessen and Allenport, Pa., Works of **Pittsburgh Steel Co.** He was works accountant at Monessen and is succeeded by **A. J. Lammay**, former assistant to the works accountant. **Clarence M. Feehan** was promoted to assistant superintendent of the Monessen open-hearth department.

Responsibilities of **Lewis M. Parsons**, vice president, **United States Steel Corp.**, at Washington, are extended to include the Philadelphia area. He will maintain offices in both cities.

David S. Gibson was appointed general manager of purchases for **Worthington Corp.** and its two subsidiaries, Electric Mfg. Co., Minneapolis, and Wintroath Pumps Inc., Alhambra, Calif.

Clearing Machine Corp. established sales headquarters in Lansing, Mich., with **George Herrick** in charge.

Harold G. Haines has become affiliated with **Woodruff & Edwards Co.**, Elgin, Ill., as metallurgist. For the last seven years he served in a similar capacity with the Semisteel Division, Howard Foundry Co.

William M. Frame was appointed director of research and technology for **National Tube Division**, U. S. Steel Corp., Pittsburgh. He succeeds **O. P. Adams**, retired. Since joining the division in 1952, Mr. Frame has been executive assistant, operating department.

E. B. Tilton, former president and treasurer, Vilter Mfg. Co., was elected chairman and chief executive officer of **Nuclear Instrument & Chemical Corp.**, Chicago.

Laube Steel Co. appointed **Louis E. McIntosh** district manager in the Dayton, O., area where the firm has opened a new sales and engineering office. **Lou J. Roubeck** is assistant district manager.

Galen W. Ewing joined **Central Scientific Co.'s** research and engineering division as a research chemist in the field of instrumentation for chemistry. He will be located at Chicago.

William F. Lange was promoted to the newly established position of assistant chief engineer for **Peabody Engineering Corp.**, New York.

Leroy V. Stewart was made general chief clerk of **Youngstown Sheet & Tube Co.'s** strip and tin accounting department, and **Leo R. Bielecky** was advanced from as-

RALPH J. WIETHORN
. . . sales office mgr., Harbison-Walker

A. A. FOMILYANT
. . . Rockwell's Macnick Div. gen. mgr.

R. M. STOTSENBURG
. . . sales mgr., Fielden Instrument Div.

sistant to general chief clerk in the invoice and freight division, accounting department, both positions at East Chicago, Ind. **Steve Cidylo** becomes chief draftsman for the Chicago district plants.

Harbison-Walker Refractories Co., Pittsburgh, appointed **Ralph J. Wiethorn** as manager, Pittsburgh general sales office. Mr. Wiethorn, who recently celebrated his fortieth year with the company, has filled a number of positions in the organization.

Guy W. Vaughan was elected a director of **John Chatillon & Sons**, New York. He is former chairman of Curtiss-Wright Corp. and Wright Aeronautical Corp.

Rose Co., steel fabricator, Milwaukee, named **Anton Kollentz Jr.** secretary and a director and **Anthony Petushek** treasurer and a director.

A. A. Fomilyant, Los Angeles district manager of **Rockwell Mfg. Co.'s** meter and valve division, was named general manager of the company's Macnick Division at Tulsa, Okla. He succeeds **W. M. Connor**, who will supervise sales and production liaison between the division's national headquarters at Pittsburgh and divisional plants and field offices. **E. M. Cloran**, western regional supervisor of gas products sales, succeeds Mr. Fomilyant.

E. F. Hauserman Co. appointed **Howard A. Stowe** sales representative in the Milwaukee area.

R. M. Stotsenburg was made sales manager, **Fielden Instrument Division**, Robertshaw-Fulton Controls Co., Philadelphia. Prior to joining Fielden, Mr. Stotsenburg was with RCA Victor Division, Camden, N. J., for ten years.

Harry J. Scott joined **Pesco Products Division**, Borg-Warner Corp., at Bedford, O., as a sales engineer specializing in automotive hydraulic steering applications. He was with the Saginaw, Mich., steering division of General Motors Corp.

J. J. Siefen Co., Detroit, elected **John F. Siefen** president.

Roger T. Kelly was named labor relations manager of the Peoria, Ill., plant of **Caterpillar Tractor Co.** He is succeeded as employee relations manager at Trackson Co., Milwaukee subsidiary, by **Robert L. Sutton.**

American Wheelabrator & Equipment Corp. appointed **Leroy J. Wieschaus** district manager of its Birmingham sales office, recently opened.

A. G. Darling, an industrial power engineer with **General Electric Co.**, Schenectady, N. Y., retired after 42 years' service with the company.

David W. R. Morgan, vice president of **Westinghouse Electric Corp.** and general manager of its South Philadelphia plant since 1946, was appointed to the headquarters staff of John K. Hodnette, vice president in charge of all company industrial products divisions. Mr. Morgan will have headquarters in Pittsburgh.

Appointments at **Westinghouse Electric Corp.** include **James C. Sheehan** as central district finance representative for the appliance division at Mansfield, O., and former FBI Agent **W. H. McLaughlin** to the newly created position of administrator, security and plant protection.

Robert L. Brownlee, manager of Carboloy Department's engineering administration, was named plant manager of **General Electric Co.'s** distribution assemblies department, industrial power components division, at San Francisco.

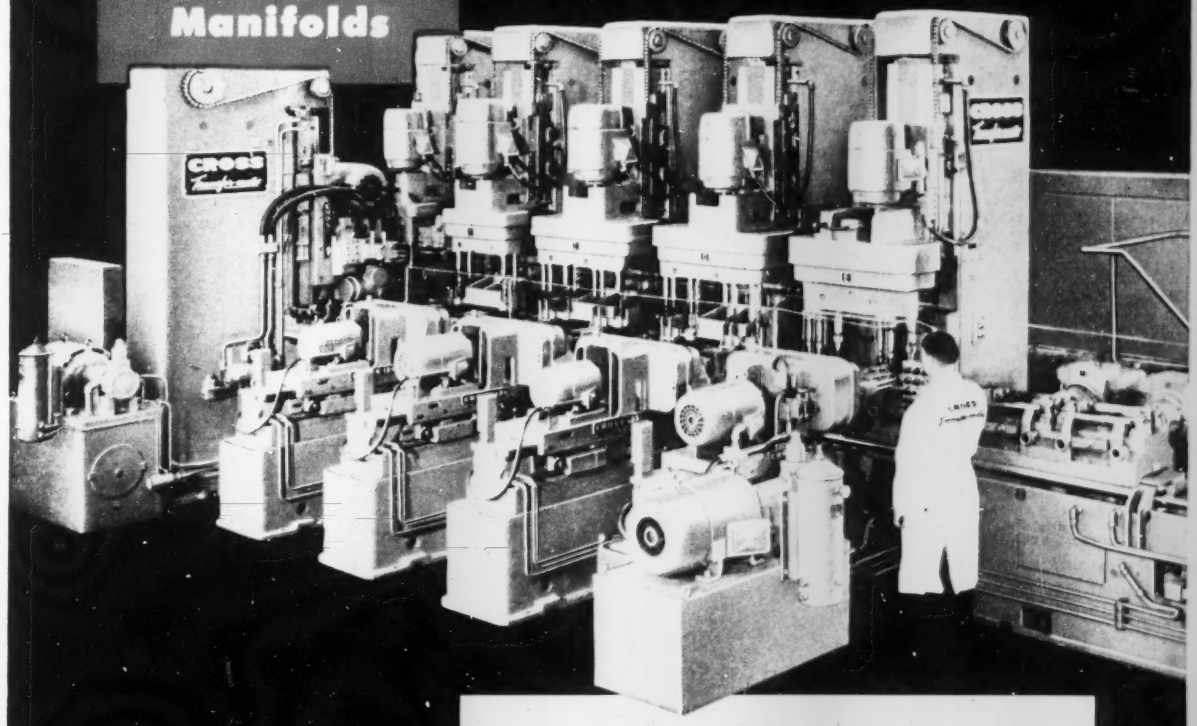
Detrex Corp. of Detroit appointed **Rodney E. Sagendorf** administrative assistant to the director of sales. For the last two years he has been chief of the chlorinated solvents section, Chemical Division, National Production Authority in Washington.

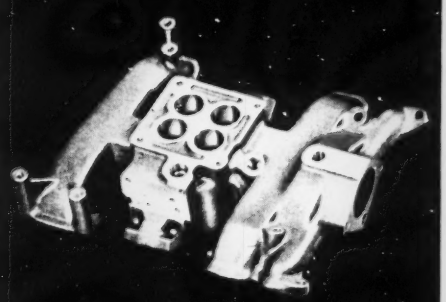
Steve Yacus was elected secretary-treasurer, **Metal Finish Inc.**, Newark, N. J. He was most recently employed as sales engineer by Almco Division, Queen Stove Works, in its eastern branch. He formerly was with General Motors Corp.'s Buick-Oldsmobile-Pontiac Division, as superintendent of metal finishing.

Lewis-Shepard Products Inc., Watertown, Mass., appointed **Henry V. Armagnac** district manager of the

Drills, Bores, Mills, Intake Manifolds

Another Transfer-matic by Cross





- 218 parts per hour at 100% efficiency.
- Seven stations including loading and unloading.
- 54 operations—22 drilling, 8 chamfering, 2 reaming, 12 tapping, 8 boring and 2 milling.
- Two parts machined at one time in each station.
- Palletized work holding fixtures and automatic transfer from station to station.
- Power wrenches for automatically operating work holding fixtures.
- Other features: Pre-set tools, built-in chip conveyor, automatic cleaning unit for removing chips from fixtures, J.I.C. Standard Construction.

Established 1898

THE CROSS CO.

DETROIT 7, MICHIGAN

Special MACHINE TOOLS

Middle Atlantic region. He has been with the company for seven years and since 1952 has been a Lewis-Shepard sales representative in the New York area.

Koehring Co., Milwaukee, appointed **E. A. Smith** vice president and manager of its two export sales subsidiaries, Koehring Inter-American Co. and Koehring Overseas Co. **M. O. Messenger** is assistant sales manager. Mr. Smith succeeds **R. E. Stewart**, resigned.

Ralph Julin, who formerly represented Wolverine Tube Division, **Calumet & Hecla Inc.**, in its Des Moines office, moved to the midwestern district sales office in Chicago. His former duties are assumed by **Thomas E. Goodyear**, formerly office sales representative in the company's general sales office in Detroit.

Hubert R. Carlson was made regional zone manager of the southern division of Rockwell Mfg. Co.'s **Delta Power Tool Division**. He will have headquarters at the Atlanta office of the company's meter and valve division. Before joining Rockwell, Mr. Carlson operated his own company, Carlson Saw & Equipment Co., Oklahoma City, Okla., for 12 years.

Charles B. Thornton, vice president and assistant general manager, and **Harold L. George**, general manager, **Hughes Aircraft Co.**, Culver City, Calif., have resigned from the company.

Frank A. Armstrong, Chicago district sales manager for **Pratt & Whitney Division**, Niles-Bement-Pond Co., retired after 40 years with the company.

GEORGE L. BITTING
. . . Kaiser Aluminum & Chemical promotion

George L. Bitting was promoted to assistant product manager for foil by **Kaiser Aluminum & Chemical Sales Inc.**, Oakland, Calif. His headquarters are in Chicago.

Philip C. Muccilli was made production manager of **National Lead Co.**, New York, succeeding **E. R. Rowley**, who becomes president of **Titanium Metals Corp. of America**, subsidiary of National Lead and Allegheny Ludlum Steel Corp.

Eaton Mfg. Co.'s axle division named **William S. Hammel** Chicago district sales representative. He served as Washington representative from 1942 to 1953.

K. G. Farrar was promoted from works manager to general manager, **Douglas Aircraft Co.'s** Long Beach, Calif., division. He succeeds the late **James Simpson**.

SIDNEY H. WEBSTER
. . . Jack & Heintz district manager

Sidney H. Webster was made manager of the northeastern district, **Jack & Heintz Inc.**, Cleveland. His headquarters will be in New York where he succeeds **George Craig**. Mr. Webster was previously assistant to the president, aviation engineering division, Avien-Knickerbocker Inc., and before that was manager of aircraft sales engineering of Eclipse Pioneer Division, Bendix Aviation Corp.

L. L. Williams was appointed Chicago district sales manager, apparatus and supplies division, **Westinghouse Electric Supply Co.** He has been manager of the Indianapolis branch and is succeeded there by **R. B. Mowe**, former branch manager in Ft. Wayne, Ind.

Luther E. Lawrence was elected assistant treasurer, **Fruehauf Trailer Co.**, Detroit.

OBITUARIES . . .

William Fairhurst, 62, vice president and sales manager, **Dana Corp.**, Toledo, O., died Oct. 2.

Herbert A. Gottschalk, 56, sales management executive of **Kearney & Trecker Corp.**, Milwaukee, died Sept. 26.

Thomas J. Lopiccolo, president, **American Research Corp.**, Bristol, Conn., died Sept. 16 in the American Airlines plane crash at Albany, N. Y. He formed the corporation early this year.

C. Louis Meyer, 67, founder and chairman, **Ceco Steel Products Corp.**, Cicero, Ill., died of a heart attack Oct. 5.

Hugh D. Cameron, 59, vice president, **Jones Superior Machine Co.**, Chicago, died Sept. 28.

Rex L. Peavey, 51, head of production control at **Eastman Kodak Co.'s** Camera Works, Rochester, N. Y., died Sept. 29.

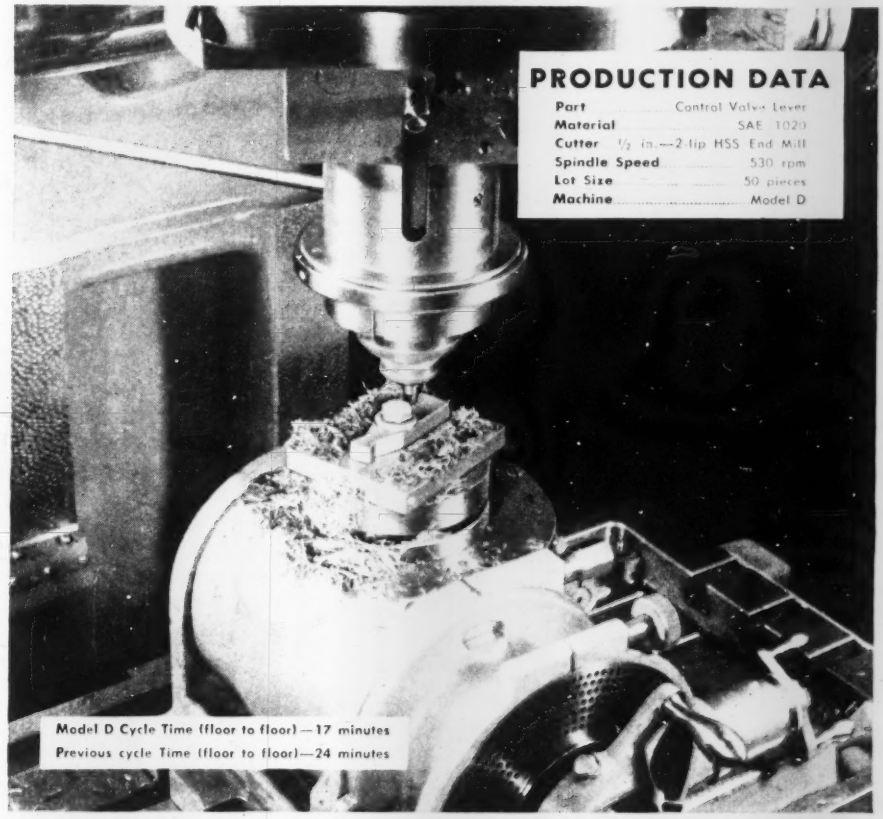
John W. Shepherdson, 74, who retired in 1952 as executive vice president of **Morgan Construction Co.**, Worcester, Mass., died Sept. 30. He had served in a consulting capacity to the directors following retirement.

R. A. Carter, 41, production control supervisor at **Lockheed Aircraft Corp.**, Burbank, Calif., died Sept. 22.

Edwin O. Larson, 62, general manager, **Syracuse Chilled Plow Co. Inc.**, Syracuse, N. Y., died Sept. 28.

Fitch S. Bosworth, 63, St. Louis representative of **Falk Corp.**, died Sept. 22.

This part is finish milled direct from the blueprint, with a single setup, in 17 min.!

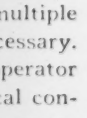


Kearney & Trecker Model 2D Rotary Head Milling Machine saves six hours on 50 piece run

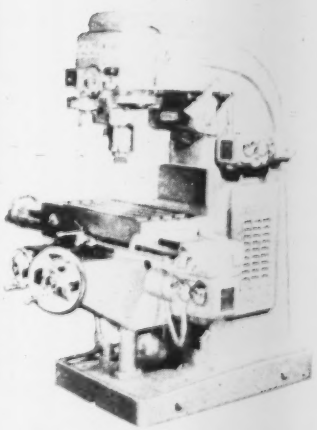
HERE is another example of the tremendous time and tooling savings possible with the rotary head milling method.

This manufacturer used to complete a control lever every 24 minutes. Now the same work is completed in only 17 minutes . . . and no multiple setups or expensive form cutters are necessary. The blueprint is the only guide the operator needs — the machine's precise mechanical control of the cutter's angular and radial movements does the rest.

Here's the Rotary Head Milling Machine Production Idea Booklet. It contains several examples of how this method has been found exceptionally efficient in solving production, die, forging and metal pattern milling problems. It's yours for the asking.

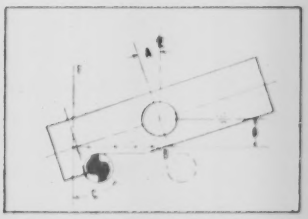


Address requests to Kearney & Trecker Corp., 6784 W. National Avenue • Milwaukee 14, Wisconsin

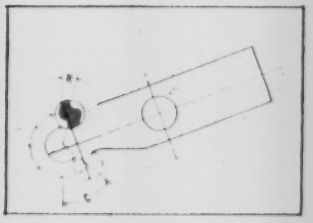


KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

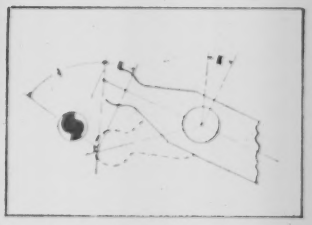
THIS IS THE MACHINE that will handle your light production milling faster, easier and at tremendous savings over any other method. If you have any production problems in plastic molds, die casting, forging and stamping dies, or selected production milling operations — investigate the Model 2D.



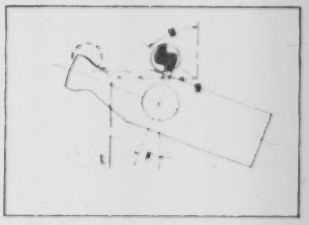
1. MILL 20° ANGLE. Index piece to angle (A), offset spindle slide to radius (B), set rotary head to angle (C), saddle to (D). Feed table (E) to (F).



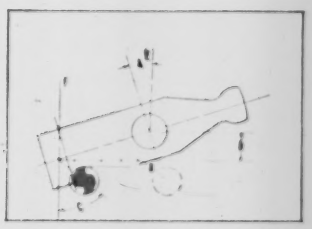
2. MILL .642/.645 DIAMETER. Rotate head angle (C) to angle (H).



3. MILL 1¾ IN. RADIUS. Rotate head fromangle (H) to angle (J), index dividing head from angle (A) (Oper. 1) to angle (K).



4. MILL 20° ANGLE. With piece at (K), move center of head to (L), rotate head to (M). Feed table (L) to (N).



5. MILL SAME FORM ON OPPOSITE END. Repeat operations 1 through 4 by indexing the workpiece to angle (A Oper. 1).

THE BURLINGTON LIARS' CLUB
SPINS A YARN FOR BAKER'S MAGDOLITE

Dinner on the Run

A crusty old sourdough settled down to camp one night beside a butte in Western Kansas. While he was cooking his meal, the wind whipped around the butte, scattered his coals and started a prairie fire. The point that made the old-timer hopping mad was that his supper was only half cooked . . . and he had no more fuel.

So, grabbing his coffee pot in one hand and his skillet in the other, he lit out after the prairie fire. "You know," he said afterwards, "the wind was blowing so hard that I chased that doggoned fire for five miles before I got my bacon fried!"

Chasing a prairie fire to cook your dinner is almost as bad as running around to locate a dependable source of dolomite. Fortunately, if you are a customer of The J. E. Baker Company, this presents no problem. Three plants, located in York and Billmyer, Pennsylvania and Millersville, Ohio, assure you of always having an adequate supply of BAKER'S MAGDOLITE, the original deadburned dolomite. You can depend upon the superior chemical, physical and mineralogical composition of BAKER'S MAGDOLITE. It's always five ways better . . . Composition, Preparation, Economy, Strength, Quality.

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PRODUCTS
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MAKERS OF BAKER'S MAGDOLITE

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THE J. E. BAKER COMPANY
YORK, PENNSYLVANIA
Plants: York, Billmeyer, Pennsylvania — Millersville, Ohio

New Firm Buys Foundry

Sheboygan Castings Corp. buys Cherry-Burrell foundry; names Harry Rogers general manager

CHERRY-BURRELL Corp., Chicago, sold its gray iron foundry in Sheboygan, Wis., to Sheboygan Castings Corp., a newly-formed company in the latter city. Harry Rogers is general manager of the foundry.

F. B. Beattie, Wisconsin division manager for Cherry-Burrell, says its Milwaukee plant will continue to produce milk bottle filling equipment. His company, a major producer of dairy, food and industrial processing equipment, purchased the Heil Co.'s Beverage Bottle Washer Division last month and will carry on this phase of its business in Cedar Rapids, Iowa.

"Increased availability of stainless steel and improved milk consumption indicate continued improvement in the firm's outlook for the fourth quarter and 1954," says Mr. Beattie.

Kennametal Makes Appointment

Kennametal Inc., Latrobe, Pa., established a southern sales district with E. J. Conlan as district manager. Headquarters office for the district is at 70 Fourth St., Atlanta. The company appointed as representatives: Walter Henry and Frank Minion in the Cleveland district office; Andrew Horvath in the Philadelphia office. Service engineers were added to Kennametal's district staffs as follows: Gerald J. Kelley, Detroit; James R. Morgan, Cleveland; Albert L. Morshauser, Cincinnati.

Westinghouse To Build Plant

Westinghouse Electric Corp., Pittsburgh, plans to build a multi-million dollar packaged air conditioning plant near Staunton, Va. The project is an important part of the firm's current $296-million expansion program, second such major expansion the company has undertaken since World War II, says Emery W. Loomis, vice president in charge of the company's Atlantic region. The first, completed in 1951, involved expenditure of more than $130 million and increased production by 50 per cent. The current program, now nearing completion, will again increase production by 50 per cent. The plant will be operated by the Westinghouse Air Conditioning Division, headquartered in Hyde Park, Mass.

Equipment Firm Organized

L. & D. Equipment Co. Inc. has been incorporated in Rome, N. Y., for the manufacture and sale of supplies and accessories for the automobile and truck industries. The firm is capitalized at $50,000.

Holcroft Names Representative

Holcroft & Co., Detroit, selected Day Engineering Co., Ardmore, Pa., to represent the company in the East. Holcroft supplies furnaces for every production heat treating requirement.

Jacobson Buys Nut Division

Jacobson Mfg. Co. Inc., Kenilworth, N. J., producer of punched nuts, purchased Nut Mfg. Division of Eagle Lock Co., Terryville, Conn. "These expanded facilities," says Harvey Jacobson, president, "will enable our organization to produce punched nuts in a much greater volume. . . .This will also bring about a substantial increase in savings to all users."

New Firm To Make Tools

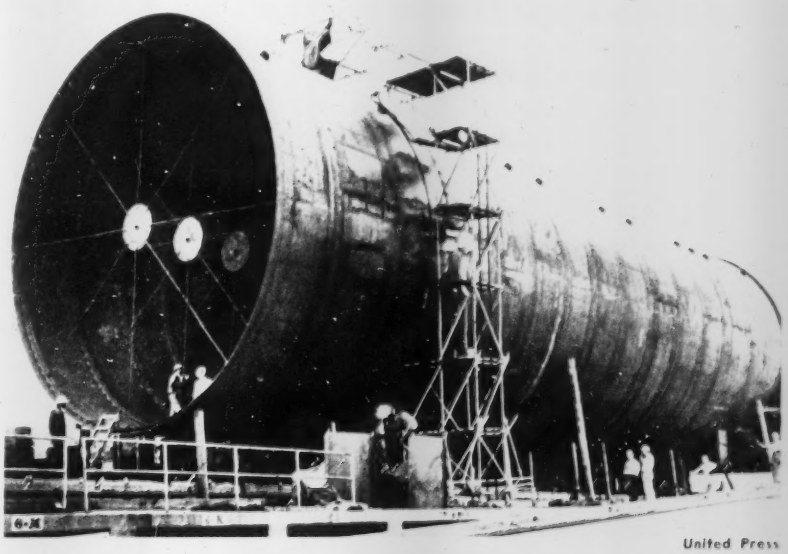
Cle-Cut Products Inc., 1921 Main St., Santa Monica, Calif., was formed to produce regular and special diamond tools. Co-owners are William F. Feyrer and William Weese.

Dravo Moves Department

Machinery Division, Dravo Corp., Pittsburgh, moved headquarters of its heating department to larger quarters at 411 Seventh Ave., that city.

Flexonics Corp. Expands

With completion in October of a 30,000-sq-ft addition to its Memphis, Tenn., plant, Flexonics Corp., Maywood, Ill., will transfer brass bellows production to Memphis from the pilot plant at Elgin, Ill. Output of brass bellows, widely used in valve seals and various types of thermostatic and pressure controls, will be stepped up six times. The move climaxes seven years of research and development of the product, involving an expenditure in excess of $2 million. Flexonics Corp., formerly known as Chicago

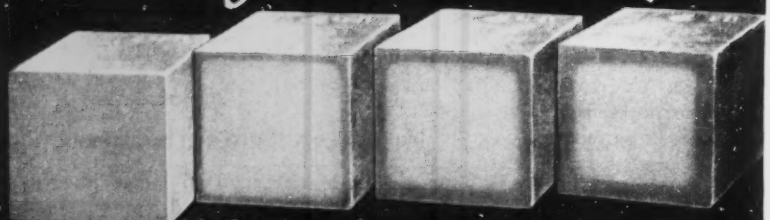


United Press

Tube for Texas Underwater Tunnel Dwarfs Welders

Workmen weld a huge steel tube, one of nine sunk into a trench to form the liner for the 3009-ft Baytown-La Porte, Tex., tunnel, opened Sept. 19 under the Houston ship channel. Total of 8.5 million lb of steel went into the liner

Depth is Important in Surface Hardening



One unhardened and three surface hardened test blocks cut for inspection

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GUARANTEED PITTSBURGH ARMORED GEARS

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The exact depth of surface hardening is one of the most important factors in the exclusive PITTSBURGH **Armored Gear** formula. The metal, machining, and overall heat-treating are very important in the long service life of PITTSBURGH GEARS, and with surface hardening to the correct depth for the use the gears will be put to, you can expect unusually long service.

PITTSBURGH **Armored Gears** are guaranteed to give five times the life of untreated gears, one to one and one-half the life of oil-treated gears, and equal or longer life than any other gear in identical service. **Armored Gears** are quickly identified by their distinctive corrosion preventive coating of "**Pittsburgh Purple**."

Let us quote on one of your requirements. Then put the PITTSBURGH **Armored Gear** to work. See how much longer it lasts—and how much less your service cost is. Send your specifications today.

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subsidiary of **BRAD FOOTE GEAR WORKS, INC. • CICERO 50, ILLINOIS**

Metal Hose Corp., also makes flexible metal hose, expansion joints and aircraft components. Norman Dawson is superintendent of the Brass Bellows Division at Memphis. Frank Brence continues as manager of the Memphis plant.

No Dishwater Hands

SCIENTISTS who now spend much of their valuable time in the laboratory over the chore of washing test tubes and other glassware will be freed soon of this onerous task. Chemical Rubber Co., Cleveland, is introducing a fully automatic dishwasher adapted especially for laboratory use.

The Labwasher is being manufactured for Chemical Rubber by Electric Appliance Division, Westinghouse Electric Corp., Mansfield, O. To adapt it for laboratory use, Chemical Rubber Co. has developed special racks which accommodate over 90 per cent of the most-used laboratory glassware.

National Welding Expanding

National Welding Equipment Co., San Francisco, purchased buildings and parking area adjacent to its present plant at 218 Fremont St. The increase of 16,000 sq ft of floor space is partially required for immediate expansion of production.

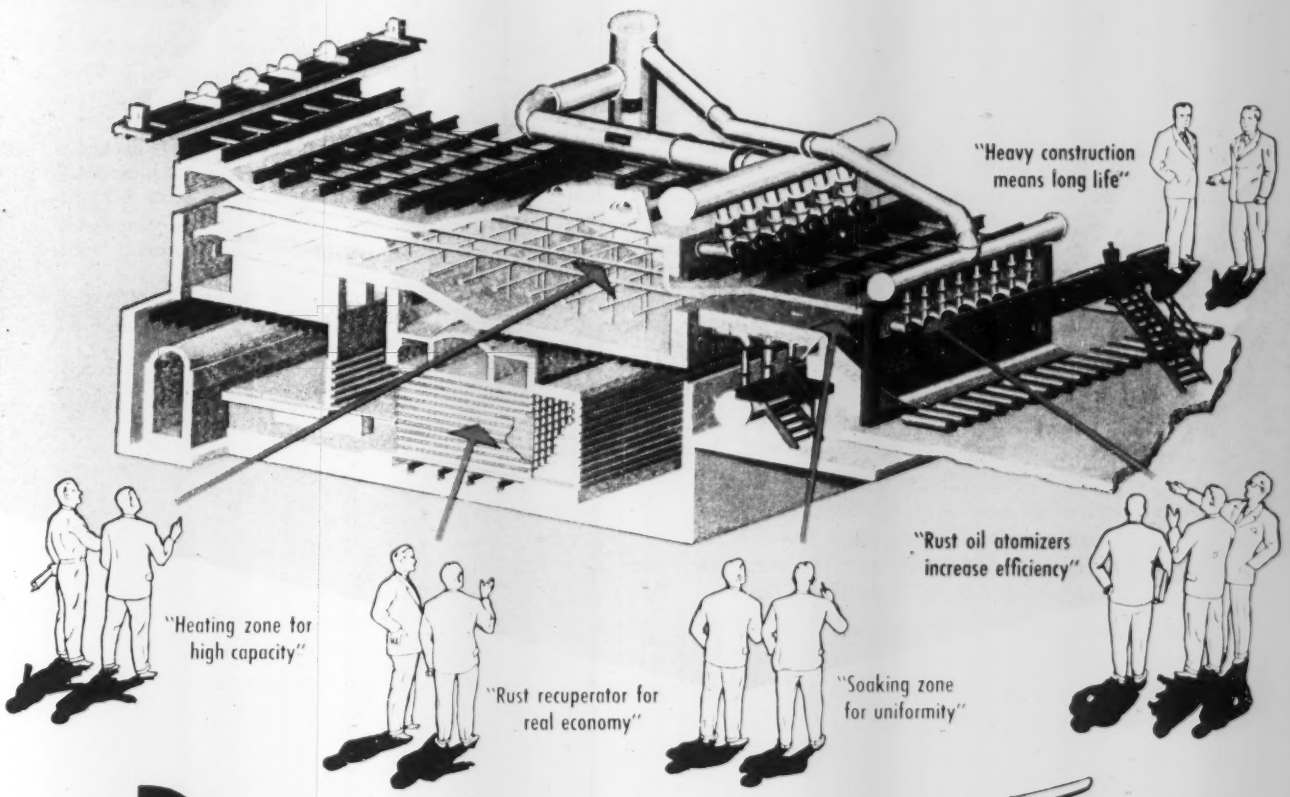
Graybar Opens Branch on Coast

Graybar Electric Co., New York, opened a branch at 655 S. "H" St., San Bernardino, Calif. J. H. Gregerson is manager; R. P. Sager, operating manager. Pacific district manager is S. W. Scott.

National Supply To Build

National Supply Co., Pittsburgh, awarded a contract for design and construction of a divisional warehouse and office at Alice, Tex., to Walter Kidde Constructors Inc., Houston and New York. The building is scheduled to be completed by Nov. 15.

FURNACE MEN KNOW THEY'RE BETTER



RUST *Continuous Reheating Furnaces*

PROVIDE ACCURATE TEMPERATURE CONTROL.. FOR SLABS, BLOOMS, BILLETS, BARS, ETC.

Yes, furnace men know the advantages of Rust's patented zone controlled, double or triple-fired, recuperative, continuous furnaces. They give positive, automatic control of heating quality and tonnage output. Each furnace is individually designed to meet specific needs and provides 100% accuracy in the control of predetermined heating temperatures. Flexibility is achieved by simply changing the fuel firing rate in the heating zone. It means maximum heating efficiency with a minimum of fuel.

In addition to reheating furnaces, Rust builds other types (designed for any fuel) for practically all metallurgical heating needs. For either new or modernization projects let Rust quote on your requirements.

THE WHOLE JOB IS ___ JOB WITH A

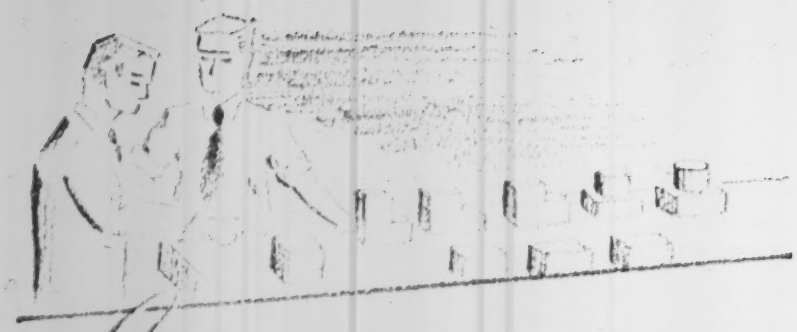
RUST "PACKAGE" CONTRACT

One contract covers everything ... from blue print through start up. Rust assumes responsibility for design, manufacture, erection, and is prepared to undertake all phases of the work with its own forces, including wiring and piping. This results in substantial savings. One profit instead of pyramiding prices which occur where many subs are employed.

RUST FURNACE COMPANY

Pioneers in Furnace Design

RUST BUILDING **PITTSBURGH, PA.**



Cut **PRODUCTION COSTS with the** *right* **plant layout**

Many of our clients are amazed by the cost savings realized when we "revamp" their plant layouts. This entails the rearrangement in equipment, the elimination of unnecessary handling operations, and the complete reorganization and integration of their "production flow".

The right kind of plant layout stems from an objective approach toward every phase of production. It helps to iron out all the production "kinks", reduce inventories, lower handling time, eliminate back-tracking, and assist in production control.

Pioneer has developed a thorough system of procedure in transferring the poor plant layout into one that reaps cost savings far beyond anything anticipated by the client. This procedure entails the preparation of process flow charts, taking into consideration such factors as methods, material handling, temporary and permanent storage, and inspection of materials. The flow chart is then transferred into a set of templets . . . or scale models . . . which is developed into a plant layout, allowing us to analyze the client's production from all angles.

We'll be glad to help show you how to cut production costs . . . with the right plant layout . . . tailored to meet your specific production needs! Send today for Bulletin 162-G on "How to Harness Your Production".

19662 JOHN R STREET

DETROIT 3, MICHIGAN

Equipment Firms Merge

Rockwell Spring & Axle Co., with assets in excess of $155 million, plans wider diversification

CONSOLIDATION of Timken-Detroit Axle Co. and Standard Steel Spring Co. to form Rockwell Spring & Axle Co., Coraopolis, Pa., became a reality Oct. 1. It brought into being an industrial organization with assets over $155 million.

The two predecessor companies will continue under their own names as divisions of Rockwell Spring & Axle Co., which maintains 24 plants located in 19 cities.

COL. W. F. ROCKWELL
. . . heads merged companies

No plant management changes are contemplated, says Col. Willard F. Rockwell, chairman of the board of the consolidated organizations.

Diversification — "Although Rockwell Spring & Axle Co. will remain engaged principally in the automotive equipment business," Colonel Rockwell says, "we know that the line of products of each division will complement the other and give the new company a broader base and a desirable diversification of products.

"Further, the pooling of management and engineering talents and techniques is expected to result in the manufacture and sale of products which heretofore have not been made by either of the divisions, thus affording wider diversification."

President and chief executive of-

Now— ALUMINUM SOLDERING MADE EASY!

A Universal Flux For All Commercial Metals Usually Joined By Soldering

WIRE SX PRODUCTS

Aluma-Flux SOLDERING FLUX

Manufactured By
ESSEX WIRE CORP.
Ft. Wayne, Ind.

Here at last is the only flux ever developed that makes possible the *non-corrosive* joining of all types of aluminum alloys by any soldering method — manual, dip or mechanical. No cleaning is required after soldering is accomplished — Aluma-Flux leaves no corrosive residue — soldered pieces are ready for use immediately.

S-X Aluma-Flux is equally effective for soldering stainless steel, bare and galvanized carbon steel, cast iron and other ferrous alloys, copper, brass and nickel — all commerical metals commonly joined by soldering. The joining of aluminum to brass; the coating of copper with tin; and the soldering of other unlike metals is made fast and easy with Aluma-Flux.

Soldered joints in aluminum produce no corrosive action due to flux residue when exposed to salt-spray, high humidity, alkaline water, etc. Aluma-Flux shows no detrimental effect on any soldered joint.

S-X Aluma-Flux can be used with 100% satisfactory results in powdered form as delivered, or in molten form — whichever is most efficient for the job. Virtually any type of solder can be used. Aluma-Flux can be stored indefinitely without change of weight, or any impairment of fluxing efficiency. Being non-hygroscopic, it will not absorb water.

In addition to its exceptional fluxing characteristics, Aluma-Flux offers many other cost-reducing, time-saving advantages . . .

The success of S-X Aluma-Flux in the soldering of aluminum is due to the action in which the flux initially reduces surface oxides and then immediately deposits a thin layer of plating material on the solder area. Oxidation of the area to be soldered is thus prevented while the plating material serves as an approved base on which to solder. In addition to its soldering efficiency, Aluma-Flux reacts completely during the joining operation so there are no corrosive flux residues to lower corrosion resistance of the finished joint.

ALUMA-FLUX IS READY FOR IMMEDIATE SHIPMENT IN CONVENIENT SIZE METAL CONTAINERS.

Write Today For Complete Details

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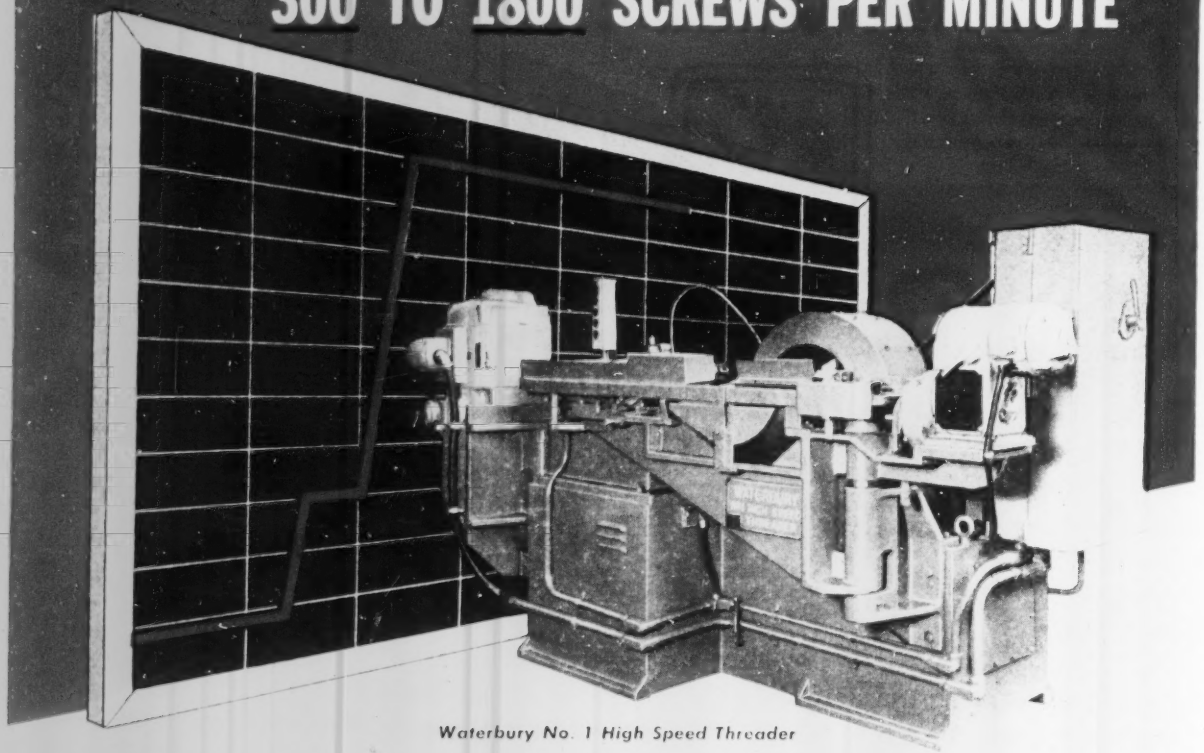
Another big Waterbury Farrel change in the screw production picture...

THIS NEW WF MACHINE THREADS 300 TO 1800 SCREWS PER MINUTE

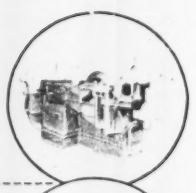


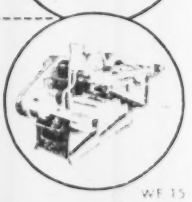
Waterbury No. 1 High Speed Threader

- Capacity: #6 to 1/4" machine screws—5/16" to 3" long—Steel, brass and other alloys.
- New Planetary Die principle threads from 5 to 30 blanks every second.
- Steel belt and twin worm feed insures continuous supply of blanks.
- Vari-Drive unit provides variable thread rolling speeds.

- Rugged construction protects alignment—gives long production life with low maintenance.
- Waterbury High Speed Threader and Waterbury High Speed Slotter (500 to 2000 per min.) an unbeatable screw production team.

Write for further details on this outstanding new thread roller. Complete information also available on the Waterbury High Speed Slotter or on any other Waterbury machine.





WF 15

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COLD PROCESS BOLT AND NUT MACHINERY — Headers (all types) • Rivet Machinery • Trimmers • Thread Rolling Machines • Slotters • Nut Formers and Tappers, etc. POWER PRESSES — Crank, Cam and Toggle; also Rack and Pinion Presses • Eyelet Machines • Multiple Plunger Presses • Horizontal and Hydraulic Presses, etc. MILL MACHINERY — Rolling Mills: Strip, Rod, Wire Flattening (For Ferrous and Non Ferrous Metals) • Also Slitters • Straighteners • Cut-off Saws • Coilers • Winders, etc. WIRE MILL EQUIPMENT — Continuous Wire Drawing Machines (Upright Cone and Tandem) • Wire Flattening Mills • Chain Draw Benches • Pointers • Swagers • Bull Blocks • String-up Machines • Spoolers, etc.

FOUNDED WATERBURY FARREL 1851

ficer of Rockwell Spring & Axle is Robert C. Enos, who formerly was president of Standard Steel Spring Co. C. J. Queenan, who has been executive vice president of Standard Steel Spring, will serve in the same capacity for the consolidated organization whose principal customers are automobile, truck and farm equipment manufacturers. Total sales of the new company are expected to be about $400 million during 1953.

The Timken Division is engaged primarily in the production of axles for commercial trucks, motor coaches, trolley busses and commercial trailers; transmissions, axles, final drives and power take-offs for farm equipment; axles and transmissions for materials handling equipment and other industrial and military uses; transfer cases, gear carriers and brakes.

In addition, Timken is a manufacturer of oil and gas home heating equipment.

Principal peacetime products of the Standard Division are automobile bumper brackets and face bars, seat and back cushion springs and tubular frames, flat leaf springs, coil springs, universal joints and assemblies, and steel gratings and treads.

Television Tube Firm Formed

Lamont Television Tube Co. is erecting a $70,000 plant in Cresson, Pa., for the manufacture of television tubes. Daniel Lamont is head of the new firm.

Baker-Raulang Names Agent

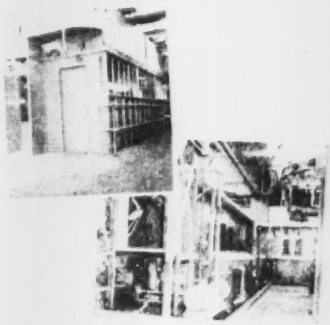
Baker-Raulang Co., Cleveland, appointed Industrial Truck Sales Inc., Latham, N. Y., as representative for its industrial trucks and cranes.

Barrett-Cravens Builds Plant

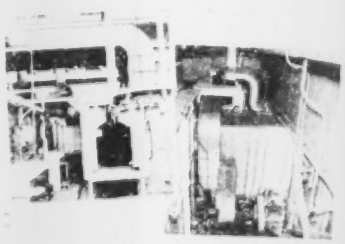
Barrett-Cravens Co., Chicago, manufacturer of materials handling equipment, is constructing a $900,000 plant at Northbrook, Ill. The structure will combine the manufacturing operations of two of the firm's plants now located in Chicago and part of the operations of the Crescent Truck Co., Lebanon, Pa., a wholly-owned subsidiary. Barrett-Cravens' general offices and engineering department will be

P-D nothing like a complete "Package"

when installing a
PAINT FINISHING SYSTEM



Complete Finishing Systems for Enamel, Lacquer, Paint or Varnish—including Metal Cleaning and Rust-Proofing Equipment—Dry-Off Ovens—Hydro Whirl Spray Booths—Filtered Air Supply Systems—Drying and Baking Ovens and Overspray Reclaiming Systems—Hydro-Whirl Dust Collecting Systems and Other Units of Special Production Equipment



Check YOUR needs with Peters-Dalton where more than 20 years of Finishing System leadership and experience are backed by expert engineering and design.

Why "pick" and "choose" components separately? P-D will install a complete, continuous Paint Finishing System that is tops in efficiency and economy because it is planned, engineered and produced step-by-step for you and you only . . . Peters-Dalton engineers lay out the *complete system* to meet whatever requirements and space limitations necessary in your plant.

Illustrated in the "Package" is a complete P-D Paint Finishing System which handles 700 electric food mixers hourly . . . so compact that it requires but two 20' x 20' bays . . . It consists of a 6-stage cleaning and rustproofing machine with automatic charging and automatic centrifugal chemical reclamation devices . . . a separate moisture dry-off oven . . . necessary cooling space . . . a completely enclosed spray operation with conditioned air supply . . . supply equipment on the floor adjacent to overhead bake ovens . . . bake oven heaters underneath ovens . . . material flows from bake ovens to assembly and packaging in next bay

A P-D installation means one responsibility for final, satisfactory results—means the performance of a Finishing System that you can rely upon for smooth, efficient, integrated operation and high quality work at lowest possible costs.

Hydro Whirl Paint Spray Booths *Industrial Washing Equipment*
Drying and Baking Ovens *Hydro Whirl Dust Collecting Systems*

P-D Peters-Dalton INC.
17892 Ryan Road • Detroit 12, Michigan

...How about Malleable?

Save . . . Machining Costs
Material Waste
Unnecessary Operations

Excellent machinability, ductility and toughness, versatile castability, and high resistance to corrosion make malleable iron the most economical and useful material available to manufacturers today.

If you are not using malleable iron's remarkable properties it will pay you to call a malleable foundry and go over your products with their engineers. Skilled in casting design, they will show you how to save money and improve your products with Malleable Iron Castings.

This hydraulic press valve was formerly made as a steel forging. Changing to a malleable iron casting with all holes cored, drilling and counter boring were eliminated resulting in a saving of 80% in machining costs and 25% in weight.

Send for "Malleable Iron Facts", useful information on malleable iron properties and uses. Just write to Malleable Founders Society, Union Commerce Building, Cleveland 14, Ohio.

Malleable FOUNDERS' SOCIETY

1800 Union Commerce Building Cleveland 14, Ohio

situated at Northbrook along with the Barrett-Electronics Corp. The plant is scheduled for completion in April.

Machine Tool Firm Building

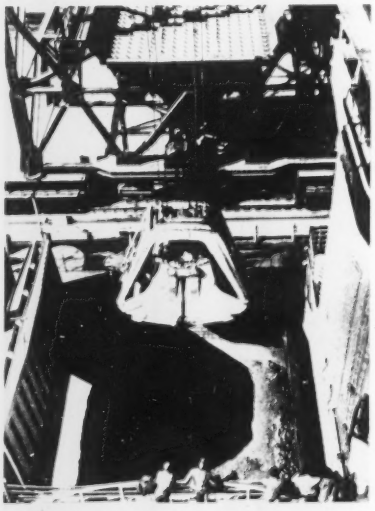
Rockford Machine Tool Co., Rockford, Ill., is building a plant addition, containing 18,500 sq ft of floor space and constituting the first step in a long-term expansion program.

Wilcox-Gay to Boost Output

Wilcox-Gay Corp., Charlotte, Mich., constructed two additional buildings, adjacent to its plants in that city, which will be devoted to a program of increased production on magnetic tape recorders and recorder accessories. The new units add 25,000 sq ft of manufacturing floor space.

Certified Alloys Opens Plant

Certified Alloys Co., Bedford, O., producer of zinc diecasting alloys, opened an alloying plant at 9323 Bermudez St., Rivera, Calif. This plant in the Los Angeles industrial area will house the company's production, research, sales and administration departments. The



Unloading Record Set

New record for unloading foreign iron ore was set at B & O's pier, Baltimore, when a 20,560-ton cargo from the Bomi Hills deposit in Liberia was unloaded in 13 hours and 55 minutes. The Blaw-Knox 200-cu-ft ore bucket, shown above, helped set this record. When empty, it weighs 35,000 lb

Louis Allis SELECT-A-SPEDE Drive gives you

PRECISION SPEED CONTROL FROM YOUR A.C. LINES

The real answer to many of your operating and production problems is right here — with the Louis Allis Select-A-Spede Drive, featuring the new Magnetic Amplifier Control. This drive provides unusual flexibility and positive control — flexibility and control you never thought possible from an A.C. line. You get increased production from your machines, fewer operating headaches, with the exact speed you need for your job — when you want it, where you want it.

Check these Select-A-Spede features:

A size for practically every need — units up to 150 horsepower.

Trouble free operation — as a result of advanced design and the use of industrial duty components.

Stepless speed range — from 1/8 base speed or less to greater than base speed. Special designs permit speed ranges to five times base speed where required. A wide variety of optional features are available, too: inching, jogging, sequence control, reversing, dynamic braking, and multi-motor ranges.

Superior speed regulation — even at low threading speeds — better than required on most machines. Use of the magnetic amplifier and a special anti-hunt circuit maintains speed constant regardless of load.

Complete protection — against overload and runaway.

Clean, filtered air — supplied under pressure to power unit. Keeps dust and dirt out — reduces maintenance.

There are probably many operations in your own plant right now where a Select-A-Spede can save you time and trouble — boost production and efficiency.

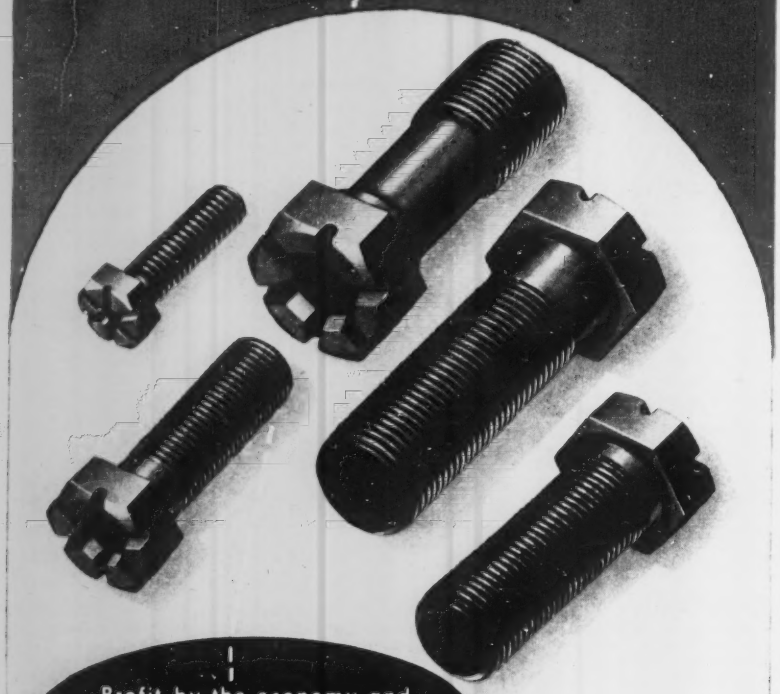
Look into this drive's many unusual, practical features. Write today for further information about the money-saving advantages of the Louis Allis Select-A-Spede or contact the district office nearest you.

SA-101

THE LOUIS ALLIS CO., Milwaukee 7, Wisconsin

Standard or special — we build it. Whatever electrical or mechanical modifications or features you need, there is a Louis Allis motor that will do your toughest jobs better.

Try CLEVELAND Slotted-Type
"Place Bolts"*
to solve vibration-resist fastener problems



Profit by the economy and one-piece simplicity of this remarkable self-locking fastener

• Find out about Place Bolts *now!* New users and new uses are multiplying daily. A cold-forged fastener made of either high carbon or alloy steel, the Place Bolt head brings *elastic spring action* to bear on seating surfaces, combining with the elastic elongation of the shank to safeguard against loss of initial bolt-tension. Vibration-and-shock-proof holding power is assured. Sizes range from 1/4" diameter upwards, standard or special. Write today for our Place Bolt Folder.

*Licensed under U. S. Patent No. 2543705.

CLEVELAND *Top Quality* FASTENERS

THE CLEVELAND CAP SCREW COMPANY
2935 East 79th Street, Cleveland 4, Ohio
originators of the Keufman DOUBLE EXTRUSION Process

plant's operations will be directed by John Sellon, who formerly headed the Zinc Division, National Production Authority.

Pacific Mercury Builds Plant

Pacific Mercury Television Mfg. Corp., Los Angeles, started construction of a $1-million plant at Hayvenhurst avenue and Chase street, Van Nuys, Calif., for research, engineering and production of television receivers.

Allis-Chalmers Names Agents

Allis-Chalmers Mfg. Co., Milwaukee, appointed American Iron-Steel Mfg. Co., St. Louis, as a distributor for its motors.

Aerovent Opens New Building

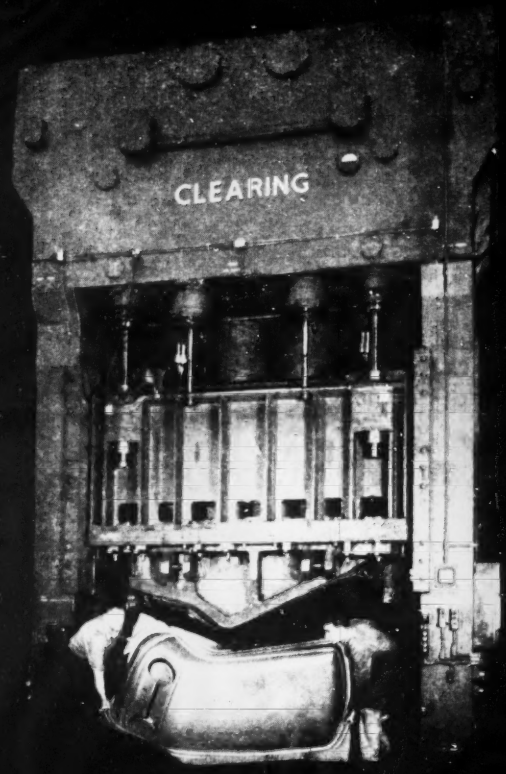
Aerovent Fan Co. Inc. opened its general office building at 700 E. Ash St., Piqua, O. It was built on the site of the original offices of the company and features many unique points of interest. The company manufactures industrial fans and ventilating equipment.

Mosebach Electric Buys Firm

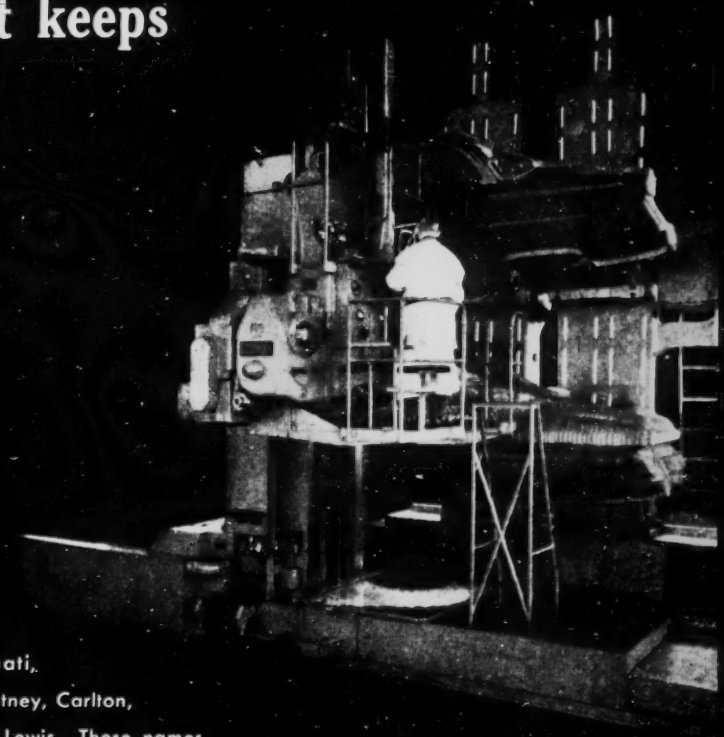
Mosebach Electric & Supply Co., Pittsburgh, merged with Allegheny Warehouse Corp., McKees Rocks, Pa. In the merger, Mosebach, manufacturer of equipment for mines, mills, railroads and other industries, is the surviving firm. The move is in line with the company's planned expansion and diversification program. Officers are: Ray Hampton, president; Ralph M Nadler, executive vice president; Harold J. Evans, vice president in charge of operations; George F. Baney, assistant vice president in charge of purchasing and customer relations; Edwin L. Core, assistant vice president and general manager.

Barber-Greene Opens Factory

Barber-Greene Co., Aurora, Ill., formally opened its factory and office facilities near Toronto, Ont. The plant is operated by its subsidiary, Barber-Greene Canada Ltd., and is engaged in manufacture of belt conveyors. Production will be extended ultimately into other company lines, including



a company is known by the machinery it keeps



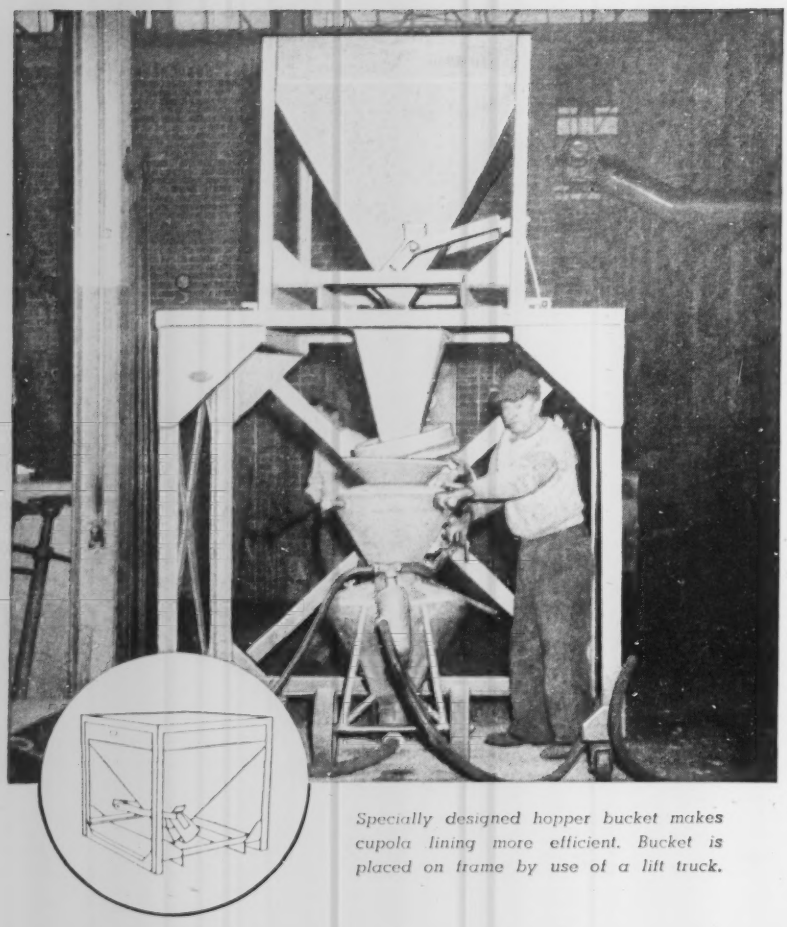
Jarecki quality is built on men and machines. The men are expert craftsmen whose names will never be news, but the names on Jarecki machinery are known around the world. Each is the finest product in its field. We acknowledge our indebtedness to names such as Clearing, Bliss, Danly, Cincinnati, Kearney and Trecker, Pratt and Whitney, Carlton, Mattison, and Giddings and Lewis. These names and the machines behind them have helped to make the name Jarecki a symbol of dependability.

JARECKI

engineering tools dies stampings assemblies plating painting

GRAND RAPIDS, MICHIGAN

JARECKI MACHINE AND TOOL CO.
JARECKI PRODUCTS INC.
JARECKI ENGINEERING CO.



Specially designed hopper bucket makes cupola lining more efficient. Bucket is placed on frame by use of a lift truck.

Solve Your Material Handling Problems With PENN IRON SPECIAL EQUIPMENT

In lining cupolas, Textile Machine Works foundry in Reading, Pennsylvania, had difficulty handling the clay mix used with their Bondactor equipment. After a study of the problem, Penn Iron Works, Inc., designed, engineered and manufactured this special hopper bucket for maximum handling efficiency.

Whatever the bulk-material handling problem in your plant, Penn Iron Works, Inc., will be glad to help with its solution. Our wide experience in designing and manufacturing all types of buckets and special handling equipment for foundries can help you cut costs . . . save time . . . increase efficiency.

For Further Information Write:

PENN IRON WORKS, INC.
READING, PENNSYLVANIA

ditch diggers, bucket loaders, portable conveyors, car unloaders, mine conveyors, asphalt mixing and paving equipment. Officers of the Canadian firm are: W. B. Greene, chairman of the board; W. B. Holder, president and treasurer; H. A. Barber, vice president; A. S. Greene, secretary and sales manager.

Rohm & Haas Builds Warehouse

A new warehouse that will double storage capacity for ammonium sulphate at Rohm & Haas Co.'s manufacturing plant in Bristol, Pa., is under construction by Luria Engineering Co., Bethlehem, Pa. Rohm & Haas produces chemicals, resins and plastics.

Palmer-Shile Opens Plant

Palmer-Shile Co., Detroit, manufacturer of materials handling equipment, opened plant No. 4, adding 15,000 sq ft of manufacturing floor space. This represents the third expansion in the last three years. Purchase of new equipment to handle the increase in production also was announced.

Efficient Linebacker

Workers feed steel shell cases from an endless conveyor into a press at Massillon, O., plant of Ekco Products Co. Using mass production techniques learned in producing housewares and commercial baking pans, this plant produced its millionth 90-mm shell case recently, bringing output of all sizes since outbreak of the Korean war to about 3 million cases

It's outstanding!
EVERY MANUFACTURER who tries Roebling high carbon flat spring steel discovers the same thing — that this spring steel is absolutely unexcelled for dimensional and mechanical uniformity... for speeding production and cutting down rejects.
You always pay for the best when you buy flat spring steel — make sure you get it by specifying Roebling. John A. Roebling's Sons Corporation, Trenton 2, N. J.
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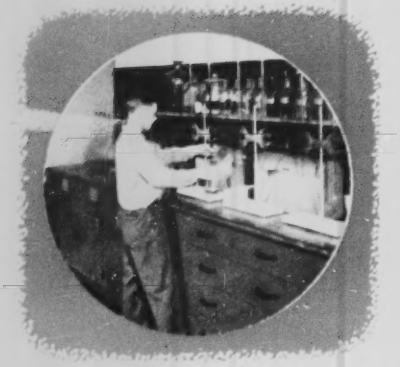
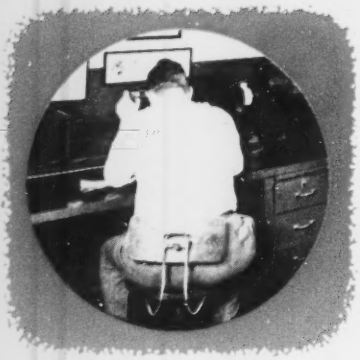
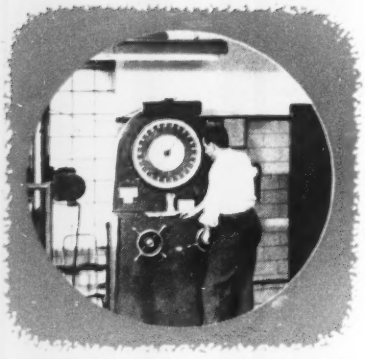
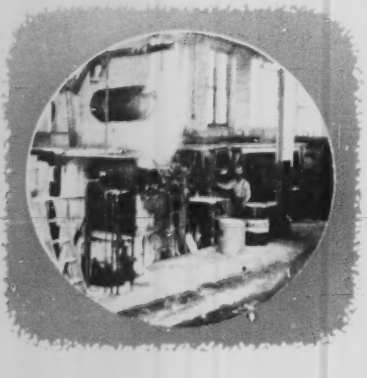
PHOTO BY McMANUS

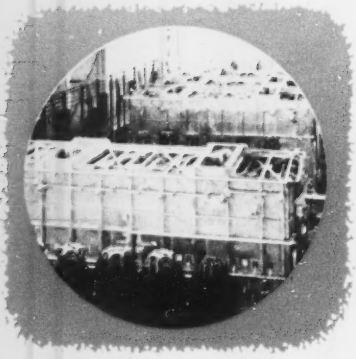


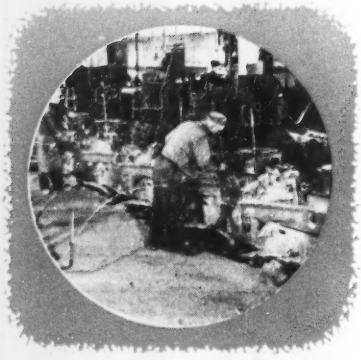




Quality control . . . every





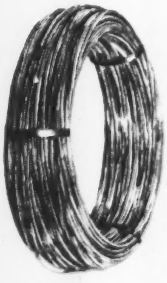


step of the way

Reliance COLD FINISHED STEELS

Our modern plant is at your service to provide special quality steels to meet your specifications. Produced on modern equipment by experienced personnel, our cold finished steel must meet the rigid inspection set up by our metallurgical department before being released for shipment. Eaton-Reliance produces steel in rounds, squares, flats or special shape sections in wire sizes 0.01 x 0.20 to 1 7/8 to 19 3/8 in coils or cut to length in the following types: cold drawn, cold rolled, centerless ground, carbon, alloy, stainless, K Monel, bronze or aluminum.

Quality control checks of the steel are made at every step of production by our chemical and metallurgical laboratory staff. Eaton-Reliance's Steel Mill produces ball and roller bearing quality key stock, cold heading quality and armor piercing shot steel whose surface tolerance and machinability must meet specific requirements. Let us help you cut your production costs with fine quality steel.



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Select The Right Materials For The Job

. . . one route to lower unit production costs in the competitive market ahead . . .

A NEW economic climate is developing in this country. Profits will depend as much on wise choice of materials and production methods as on sales. Job of materials management: Select and specify the right materials and then buy them in the most economical forms.

For many products, materials are the largest single item of cost. They account for as much as 80 to 90 per cent of the manufacturing costs in some businesses. In other plants, they equal overhead and labor combined.

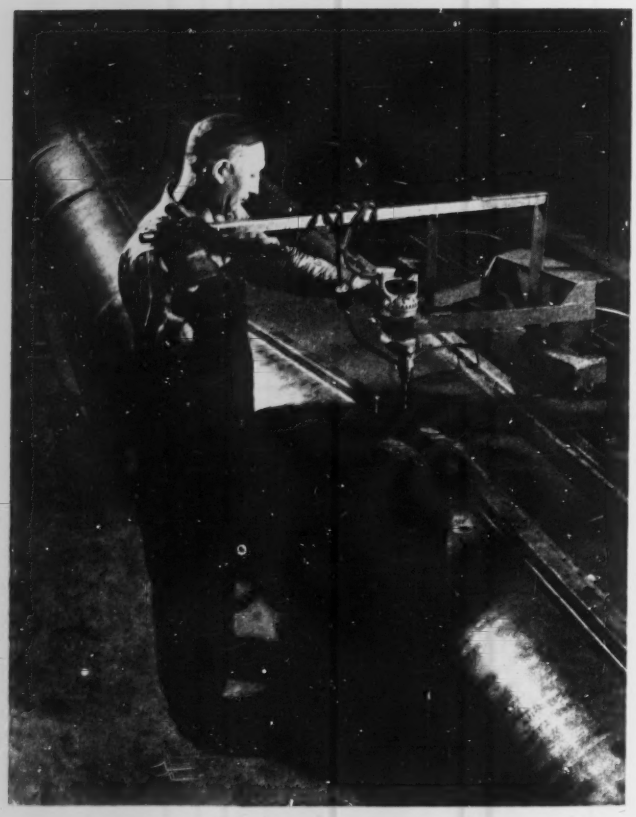
There is increasing competition among materials for all kinds of applications. New metals are fighting to gain a foothold, and old standbys, such as the irons and steels, are being improved to the point that they must be reappraised in light of their better properties.

Matter of Emphasis—In the realm of metals, the connotation *new* can be misleading. What is *new* to a research man may be several years away from practical use to a materials engineer. Keeping this in mind, STEEL presents this report on new and alternate metallic materials. Most of these developments are already on the market, but their full significance has not been realized.

Great range of alternate materials—not substitutes, but materials that will do the job well enough—is being developed to meet industry's needs.

In preparing this report, STEEL canvassed many producers for information on up-to-the minute engineering materials. It was found that developments have been numerous; possibilities for application almost limitless.

One point stands out: In this era of fast moving changes in engineering materials, the need for efficient management in materials is greater than ever before.



More Strength, Less Weight

Modern low alloy high strength steels possess a combination of many useful properties. This auto trailer is being fabricated from J & L Jalten sheets

Many modern steels are metallurgically tailored to give high strength, light weight at low cost

MANUFACTURERS are constantly striving to make their products smaller, lighter and stronger. Their attention is focused on materials with better strength-weight ratios. Titanium and the light metals are in the limelight, owing to the constant demands of aircraft for metals with more strength and less weight. Steels are making gains too at several higher strength levels.

Able to handle stresses one-third to one-fourth higher than their common steel equivalents, low alloy, high strength steels are paying their way in more and more applications. Uses are growing in automotive and transportation equipment, in home, office and business appliances and in many other products. Applications are so numerous that modern steels of this type must have a combination of many useful properties.

Versatile—Present day low alloy, high strength steels possess weldability, formability, good abrasion and fatigue resistance. Often they are called upon to develop high impact strength and ductility at low temperatures. They can be fabricated by shearing, gas cutting, punching, forming, riveting and welding.

Fortunately, some of the elements that impart strength to steel also give improved corrosion resistance. This is insurance against impairment of service life or safety due to premature failure from corrosion.

Low alloy, high strength steels have a minimum yield point averaging 50,000 psi; ultimate strength is 70,000 psi. Yield point is about 30,000 psi for ordinary carbon structural steel. Ratio of the yield strength values is about 1.5 to 1.0. This means that working stress in tension can be as much as 50 per cent higher. Usually the reduction in section is two gages. Weight saving is generally at least 25 per cent. In some applications, it may be more.

Rolling Stock — Auto industry has made extensive use of high strength steels in a variety of applications. Passenger car uses in-

clude bumpers and some body parts. Steels of this type are readily cold formed. This makes them suitable for light, high-strength pressings.

High strength steels are used to secure greater strength or weight reduction with increased service life in heavy trucks, trailers, semi-trailers, gasoline truck tanks, garbage and refuse trucks and buses.

On The Farm—Manufacturers of agricultural equipment are using low alloy, high strength steels in combines, corn huskers, threshers, fertilizer spreaders and farm wagons. They know that in equipment pulled by tractors, light weight is economy. Another bonus: Increased atmospheric corrosion resistance gives longer life.

Other uses of high strength steels are found in a diversity of products: Lamp posts, automobile jacks, cable reels, stokers, heating furnace bodies, filing cabinets and file drawer slides, cabinets, wings and lapboards of power ironers, reusable shipping containers, canal locks, gates and dams, concrete forms and welded pipe.

More Strength—To a limited extent, a field for still higher strength steel began to develop during World War II. Ordnance department was instrumental in promoting a material to meet requirements of 70,000 psi yield point after welding and stress relieving around 1100° F. Term, "Alloy High Strength Steel" applies to steels with higher alloy content and higher physical properties than the group known as "Low Alloy, High Strength Steels."

Stress relieving is important for two reasons: 1. To prevent warpage or movement of the structure during machining, subsequent to welding. 2. To improve strength and shock resistance.

Heating and slow cooling operations neutralize locked in stresses due to thermal expansion and contraction in the welded zone during fabrication.

Steel Type—Typical of this grade is a steel developed to meet U. S. Army Specification No. 57-114-1A, Class C, which calls for a minimum 70,000 psi yield point after stress relieving for not less than 4 hours at 1100° F.

Other requirements: Not more

Low Alloy, High Strength Steels

In hot rolled condition minimum mechanical properties:

Yield point—50,000 psi; ultimate strength: 70,000 psi

Usual specifications: ASTM A242; SAE 950

Name Of Steel	Producer
Aldecor	Republic Steel Corp.
Cor-Ten	U. S. Steel Corp.
	Republic Steel Corp.
	Sharon Steel Corp.
	Inland Steel Co.
Republic Double Strength	Republic Steel Corp.
Dynalloy	Alan Wood Steel Corp.
Hi-Steel	Inland Steel Co.
Hi-Man	Inland Steel Co.
Jalten #1	Jones & Laughlin Steel Corp.
Jalten #2	Jones & Laughlin Steel Corp.
Jalten #3	Jones & Laughlin Steel Corp.
Kaisaloy	Kaiser Steel Corp.
Man-Ten	U. S. Steel Corp.
Mayari-R	Bethlehem Steel Co.
N-A-X High Tensile	Great Lakes Steel Corp.
	Weirton Steel Co.
	Republic Steel Corp.
	Sharon Steel Corp.
	Granite City Steel Corp.
Tri-Ten	U. S. Steel Corp.
Tri-Ten E	U. S. Steel Corp.
(Alt. for Tri-Ten)	
Stelcoloy	The Steel Co. of Canada
Yoloy	Youngstown Sheet and Tube Co.

These automotive parts show deep drawing properties of N-A-X high tensile steel. Fender is 22 gage; wheel rim is 11 gage. Other parts include all gages up to ⅜-inch thick

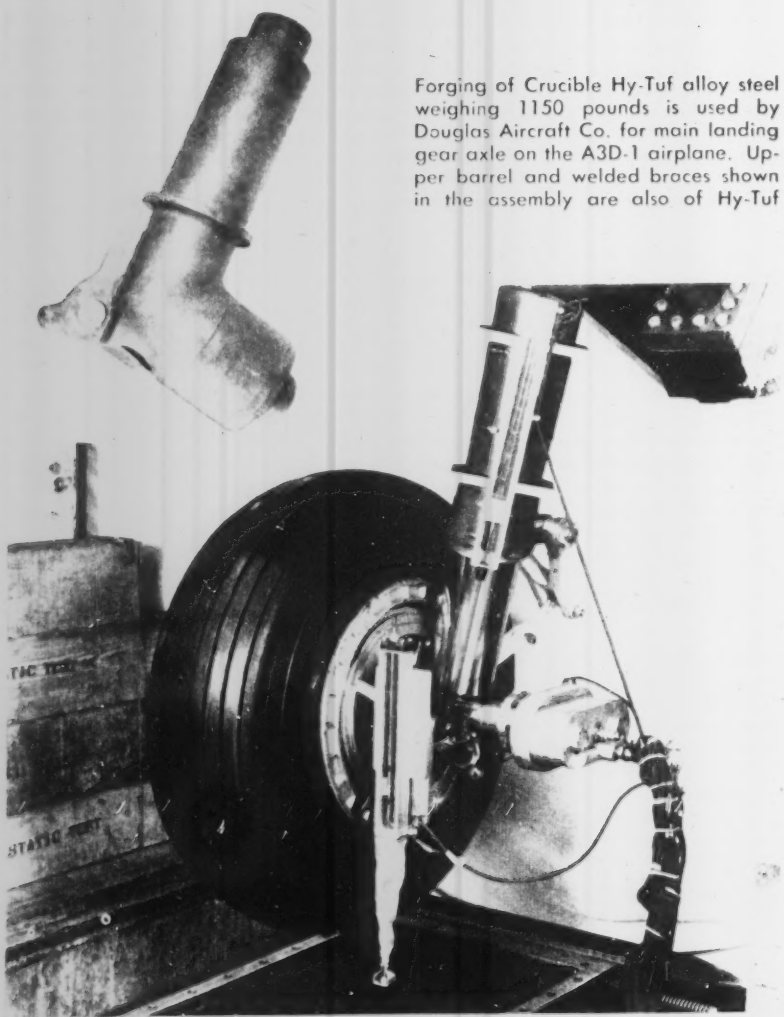
More Strength, Less Weight

Fortiweld Steel

British developed "Fortiweld", a low carbon, molybdenum boron steel is being explored by Kaiser Steel Co. Typical Analysis: C 0.08; Mn 0.39; P 0.022; S 0.033; Si 0.21; Mo 0.49; B 0.002

As Rolled Physical Properties For Sheets, Plates and Structurals

Product	Yield Point	Tensile Strength	Elongation Per Cent in 8-in.
4-in. x 4-in. x ⅜-in. Angle	64450	73900	26
3/16-in. Plate	72100	79400	32
⅜-in. Plate	59800	74680	27
0.130-in. Sheet Coiled	78935	91600	
0.505-in. (Forged 1" Rd)	69110	76230	22 (2-in.)



Forging of Crucible Hy-Tuf alloy steel weighing 1150 pounds is used by Douglas Aircraft Co. for main landing gear axle on the A3D-1 airplane. Upper barrel and welded braces shown in the assembly are also of Hy-Tuf

than 300 Vickers brinell hardness in the welded zone; and a tough gray fracture in the stress relieved condition on a notched break test when broken in a vise with a hammer. Later specifications for higher than 70,000 yield point material in the heat treated condition calls for fairly high impact strength in proportion to yield strength.

Steel used in these welded applications is made using alloying elements such as nickel, copper and molybdenum. This combination will dissolve almost entirely in the ferrite and produce a relatively tough material in proportion to its strength. Stress relieving temperature of 1100° F generally will develop an increase in the yield point and notch toughness above the as rolled condition.

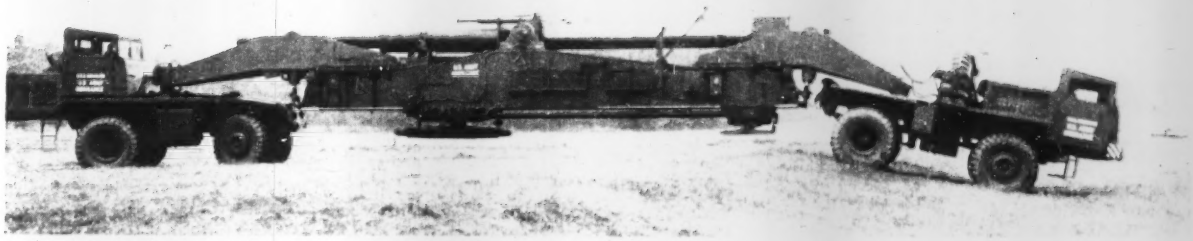
Military Pay-Off — One of the first applications was in the MI gun carriage for 155-MM, 50-calibre cannon. Tare weight of this gun carriage was reduced from 10 tons to 7 tons when redesigned on 70,000 yield point basis. Pay off: Much better mobility for the gun.

Non-Military—After the close of the war, new applications for this type of steel came to the front. While total tonnage is rather small, these applications are significant in view of results obtained either in over-all engineering design or in longer life obtained in service due to high strength and in some cases a higher resistance to corrosion or abrasion.

Cold and hot-formed plates of 65,000 psi yield point are welded in subassemblies and then into the final assembly for end underframes in Budd Co.'s stainless railway passenger cars. Next step: Stress relieve and check on a plane table for possible distortion. Over 1100 such welded structures have been placed in operation without a single failure recorded.

Heavy Duty—In coal and iron mines applications, plate and sheet of 70,000 psi yield point steel are used in mine cars, skip cars, transfer car bodies, bottom plates on loaders, cutter chain beam sections on coal cutting equipment, hoist skips, loading chute plates and various plates in coal washing equipment.

Republic Steel recently enlarged a group of furnaces in one of their



Heat-treated, alloy-steel plates produced by U. S. Steel Corp. with 90,000 psi minimum yield strength are used in the gun carriage of this Army atomic cannon

Carrying capacity of the gun carriage in proportion to its weight is example of what can be done with heat-treated, alloy-steel plates

plants increasing the melt from 200 up to 220 tons capacity. New and stronger ladle hooks were required, but piers on which the ladle rests when tapping heat and side of the ladle were so spaced that 7-inch thickness of the ladle hook could not be increased.

With only a 7-inch wide trunnion, stress at loading point would be beyond the safe limit for ordinary structural steel. Problem was solved by using 70,000 psi yield point steel, with plug weld assembly. Design was worked out using 5/16-inch plate for all but two outside plates which were ½-inch thick. Entire hook was stress relieved after welding.

Ultra High Strength Steels—Traditionally, steel is not considered a light alloy. But when heat treated to provide tensile properties of 260,000 to 280,000 psi, it has a strength-weight ratio comparable to the strongest aluminum or titanium alloys with good modulus characteristics.

High strengths are attained by quenching to a fully martensitic condition and then tempering between 400 to 475° F. To obtain maximum ductility and toughness, carbon content is kept to a minimum, consistent with the strength requirements, with a sufficient alloy content to insure complete hardenability.

Typical steel compositions are of the SAE 4340 type. New high silicon and boron steels are also being looked at.

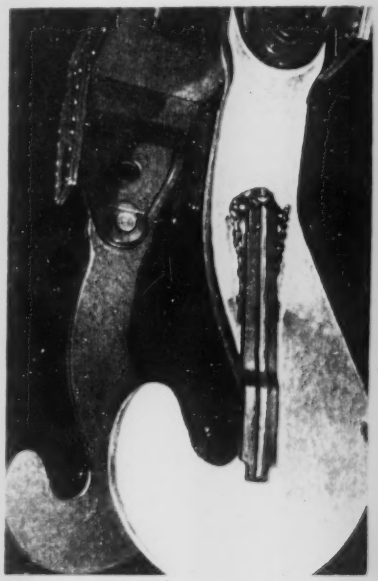
Used Here—Landing gears for aircraft are principal applications at present time. Typical design properties attained are tensile strength 260,000 to 280,000 psi, yield strength-tensile strength ratio of 75 to 80 per cent, and elongation 10 per cent in 2 inches.

By raising design level to this minimum, a weight saving of 23 per cent over the conventional 200,000 psi limit can be realized.

Three specifications are used at Lockheed Aircraft Corp. for procurement of 4340 steel to be raised to the 260,000-280,000 psi level: MIL-S-5000 for bar and reforging stock; MIL-S-5000 and MIL-F-7190 for forgings; and AMS 6415 for mechanical tubing.

Watch These — Proper design, manufacturing control and inspection are critical factors involved in the successful use of steel in this high tensile range.

Austenizing is accomplished by heating to 1500° F in accordance with the following schedule: If largest section thickness is ¼-inch, up to 1-inch, heating time is ¾-hour and holding time is 1 hour; if largest section thickness is over

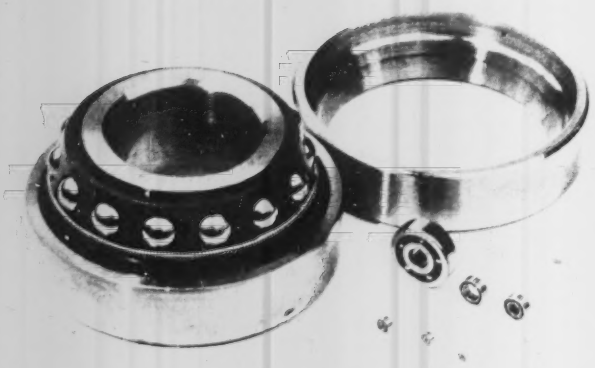


NES 70 alloy high strength steel was used in this 155-ton laminated welded crane hook in service at Republic Steel Corp.

Alloy High Strength Steel

Meets U. S. Army Spec. No. 57-111-1A, Class C.

Sample Heat Analysis	C-0.18; Mn-0.75; P-0.015; S-0.025; Ni-1.75; Cu-1.20; Mo-0.25
Average Yield Point ¾-in. plate as rolled	73,000 psi
Average tensile strength ¾-in. plate as rolled	98,000 psi
Elongation (2-in.)	17 per cent



Steel for Bearings

CLEAN steels of the type produced by vacuum melting are of particular interest to manufacturers of small precision instrument bearings. Reason: Rejection of finished outer and inner races after inspection of the ball track surface is greatly reduced.

Producers of larger bearings of high quality, such as spindle bearings in high-precision grinding machines, are also interested in metal cleanliness. One such manufacturer has produced a test lot of over 300 outer races, approximately 3½ inches O.D., from a vacuum cast alloy steel, with rejection of only 3 per cent of the races because of small inclusions in the ball track area after lapping. This is lower than rejection rate from corresponding ordinary steel.

Fatigue—Tests on Ferrovac-52100 and a commercial, SAE-52100 bearing steel performed in a Krause Rotating Beam machine at National Research Corp. show a marked difference in fatigue life. For vacuum melted steel, number of cycles to rupture at low stresses is 100 times greater than that of conventional bearing steel.

At higher stress levels, the difference is greater, with 1000 times as many cycles being required for rupture. For same fatigue life, there is 50 per cent increase in permissible stress for vacuum melted material. Because of improved fatigue properties, vacuum melted steel is being evaluated for use in thrust bearings and other heavily loaded bearings.

Hot — Nickel-chromium-molybdenum, carburizing steel has been developed by Bower Roller Bearing Co. for use in bearings at high operating temperatures. Composition used permits carburizing and hardening at temperatures that can be obtained in normal production furnaces. Special furnaces and high temperature required for heat treatment of high temperature steels are avoided. Also, high carbon through hardening steels of high alloy content present problems in annealing and machining that are minimized by use of a low carbon steel that is case hardened.

This new bearing steel has been used satisfactorily where operating temperatures up to 500° F are involved. In fact, temperature limitation is one set by lubricants rather than the ability of the steel to withstand higher temperatures. Temperatures up to 900° F for 100 hours have developed no permanent change in hardness or dimensions in the steel rings.

1-inch and up to 2-inches, heating time is 1¼-hours and holding time is 2 hours. Temperature was selected to keep to a minimum the retained austenite upon quenching in oil.

Tempering is performed in range 400 to 475° F for 4 hours per inch of cross section with a four hour minimum. Time is needed for stable microstructure.

Finally, all parts are heated at 250° F for 24 hours to stabilize any residual austenite. This promotes dimensional stability, plus freedom from residual stresses that would accrue from possible austenite to martensite conversion in service. No subsequent reheating beyond 250° F is allowed on parts.

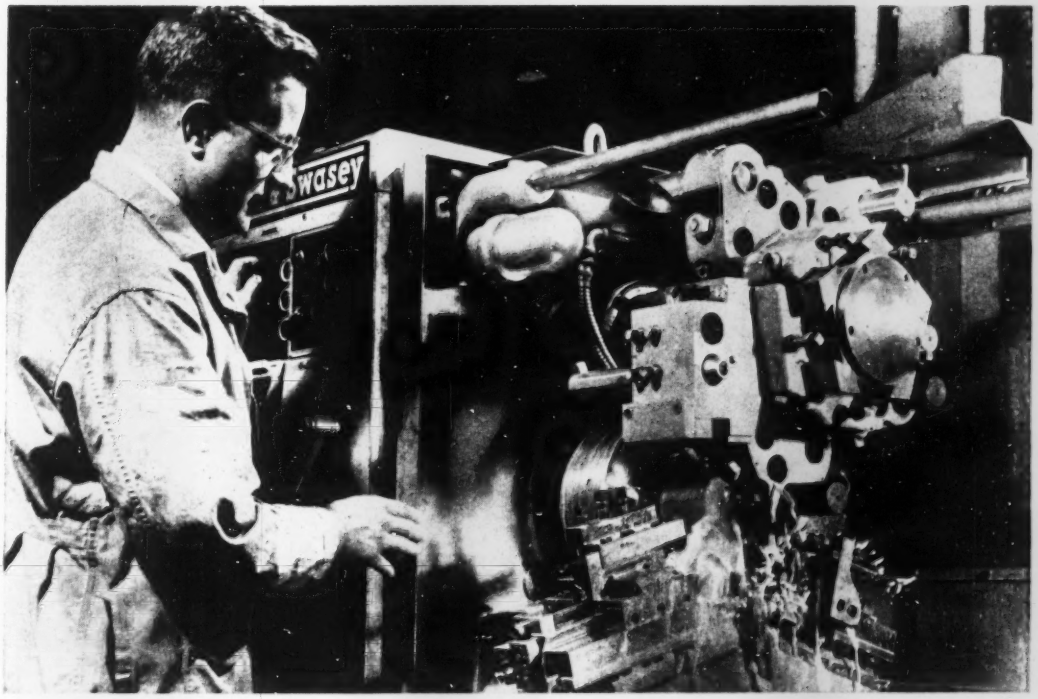
Other Grades—Ultra-high, heat-treat steels also being used or considered for aircraft design: AISI 8740, 8745, 4330; "Hy-Tuf"; "Super Hy-Tuf"; "Super TN-2." Indications are that aluminum, silicon, and vanadium additions to the ultra high tensile steels are effective in reducing brittleness and notch sensitivity after tempering.

Crucible Steel Co.'s "Hy-Tuf" is used by Douglas Aircraft Co. to fabricate landing gear assemblies, catapult hooks, and arresting hooks. Nominal analysis of Hy-Tuf: Carbon—0.25 per cent; Manganese—1.30 per cent; Silicon—1.50 per cent; Nickel—1.80 per cent; Molybdenum—0.40 per cent.

Applications for Hy-Tuf in addition to aircraft, suggested by Crucible: Automotive parts; hand tools; gears; power plant equipment; heavy construction equipment; pneumatic tool parts; rock drill bit bodies.

Properties—Hy-Tuf can be welded satisfactorily by using the string bead method; however, the weave technique tends to cause cracking. It may be readily flash welded.

Forging temperature for Hy-Tuf is 2000 to 2200° F. It should be annealed by a normalize from 1600° F followed by a temper at 1200° F for 16 hours. Alternate procedure: Heat to range 1350-1375° F, holding for one hour, furnace cooling to 1200° F, holding 16 hours and air cooling. It is hardened by oil quenching from 1600° F. Tempering in the range 400-600° F is recommended for best combination of mechanical properties.



Machinability

New steels speed up machining operations. Especially valuable for tough grades which must have high physicals

IMPORTANT advances are being made by producers in their efforts to improve the machinability of steels.

Inland Steel Co.'s Ledloy, made by adding lead to any standard grade of steel, reportedly improves machinability from 25 to 60 per cent without adversely affecting mechanical properties. Biggest pay off at present may be in improving machinability of tough, relatively-poor machining grades such as 4140.

Copperweld Steel Co. has just begun operating a new instaliation for producing electric furnace carbon and alloy steel with lead under the Inland Ledloy license.

J & L is making a C-1200 series of steels in its open hearth and electric furnaces that is said to be superior to acid bessemer steels for automatic screw machine use.

United States Steel Corp. has just announced that it is producing its MX-quality, free-machining screw stock in open hearth as well as bessemer grades. This free-cutting steel of the C-12XX type is especially controlled to improve cold-drawing characteristics. It is a fast-cutting bar stock with good surface quality and performs well when finish-machined parts must be subjected to crimping or other deforming operations.

Three Counts—Addition of lead to steel results in three machinability benefits: Reduced friction; improved chip formation; and no tool edge build up.

Studies show lead aids in lubricating the tool, both where cutting edge contacts work and where chip bears against tool face. Generation of heat is reduced and minimizes power and time needed to

cut and deform the chip. Tools tend to wear rather than burn; less friction allows higher machining speeds and production of more parts per hour. Steel which normally yields long, tough chips on a heavy cut has shorter chips, which tend to fall clear of the tool quickly when lead is added.

In normal cutting of a ductile steel, high temperatures and pressures at tool edge often cause cut metal to weld to the tool. This buildup is avoided when Ledloy is handled properly. Action of lead reduces friction and minimizes heat. Dividend is improved surface of the cut.

Availability — Two qualities of lead bearing steel became available last month for shipment from warehouse stocks at Joseph T. Ryerson & Son, Inc. First: Lead bearing AISI 4140. This is the standard, AISI 4140 alloy to which 0.15 to 0.35 per cent lead is added. Based on facts known at this time, lead bearing AISI 4140 will machine up to 50 per cent faster than standard medium carbon alloy steels. Life of cutting tools is increased as much as 100 per cent.

In the annealed state, lead bearing AISI 4140 can be machined at the same speeds and feeds as recommended for C-1117, which has a machinability rating within about 15 per cent of that of B-1112 screw stock. In the heat treated condition, lead bearing AISI 4140 also machines 50 per cent faster than standard heat treated AISI 4140.

Important — Addition of lead to standard AISI 4140 does not change the heat treating characteristics or hardenability. Mechanical properties developed in lead bearing AISI 4140 through heat treatment are reported to be identical to the properties developed in AISI 4140 without lead.

In the low carbon carburizing alloy field, Ryerson has made lead bearing AISI 8620 available from stock. This quality offers same improvement in machinability as lead bearing AISI 4140 and is heat treated in the same manner as standard AISI 8620.

Substitute — Bessemer screw grades B-1111, B-1112 and B-1113 are being duplicated or surpassed by basic open hearth grades C-1211, C-1212 and C-1213. Chemical specifications for latter are:

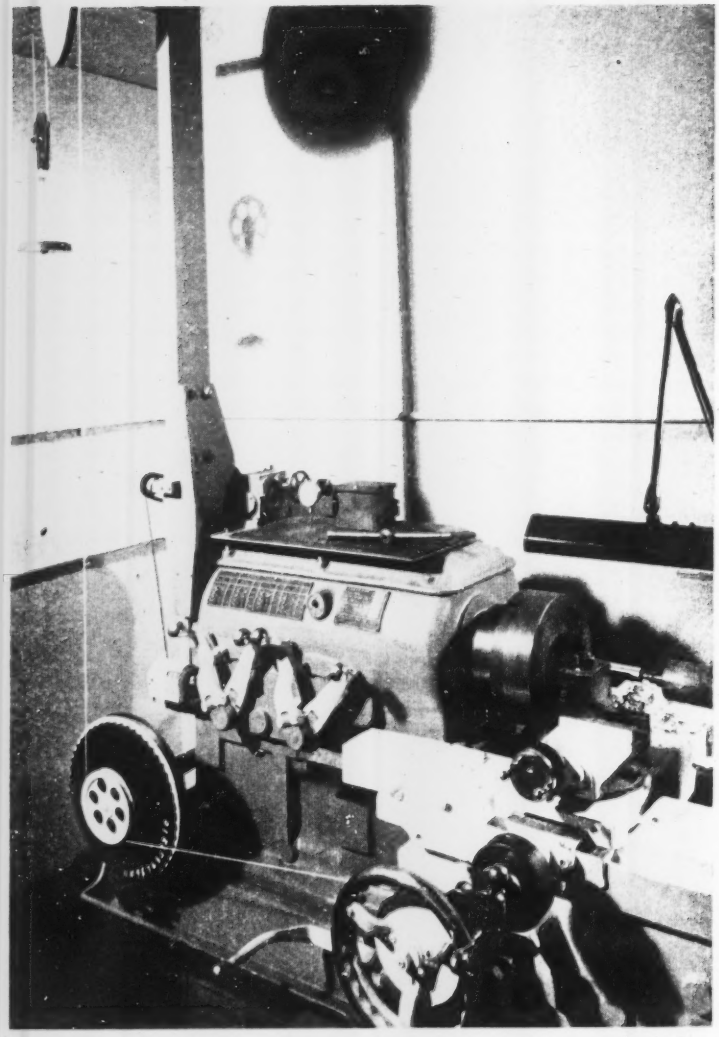
	C	Mn	P	S
C-1211	0.13 max.	0.60/0.90	0.07/0.12	0.08/0.15
C-1212	0.13 max.	0.70/1.00	0.07/0.12	0.16/0.23
C-1213	0.13 max.	0.70/1.00	0.07/0.12	0.24/0.33

Briefly, here is the open hearth practice: Straight ferromanganese is added to meet specifications. Preferred bath temperature before this step is from 2910 to 2940° F. Heat is tapped about five minutes after addition.

Flowers of sulphur and ferrophosphorous are added to meet the specifications, and if desired, nitrogen may be added in controlled amounts in any of the several available forms. Final adjustment of analysis is made by addition of a small quantity of ferromanganese.

Steel is cast in 25-inch by 27-inch, corrugated-bottle-top ingots. Capping, if necessary, is with use of a small quantity of crushed, 90-per-cent ferrosilicon. Practice results in the production of steel that exhibits excellent uniformity within the heat and a high order of consistency from heat to heat.

It is claimed that the open hearth process affords more flexibility with respect to nitrogen and phosphorus contents than the acid bessemer. This may permit manufacture of analyses that are better suited for particular applications than the conventional grades.



Machinability test in progress on a constant pressure lathe at Battelle Memorial Institute

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Hardenability

Boron steels are losing ground to standard Grades. There's a trend toward use of leaner alloys and carbon steels

EXPERIENCE gained by manufacturers and users has resolved many of the problems inherent in heat treatment of boron steels. The American Iron and Steel Institute has issued a list of new steels containing boron and tentative standard steels developed to conserve nickel and molybdenum.

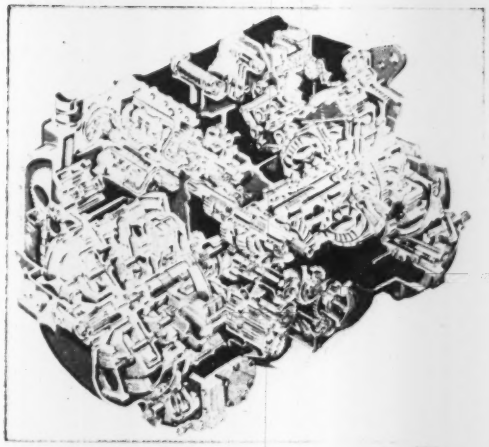
Boron steels have been tested sufficiently to indicate that in many applications they can replace more highly alloyed materials. Limitations have appeared in carburizing requirements. Most important question: Influence of boron in higher carbon levels of the case of carburized parts.

Potency of boron is great. Even when added in infinitesimal quantities it permits a substantial reduction of the standard alloying elements. For example, addition of approximately 0.001 per cent boron to a steel of about 1.3 per cent nominal total nickel-chromium-molybdenum content will give it the hardenability characteristics of a similar untreated steel of about 2.0 per cent nominal alloy content.

Need—Boron steels appear to be losing ground as more manufacturers turn to standard grades. But they all agree: It's good to know that they could use them if their backs were up against the wall in a real emergency. Higher prices, excessive core hardness resulting in distortion on quenching for low carbon types, and variations from heat to heat are some reasons for the switch to non-boron steels.

Heat Treat—Boron treated steels must be fully quenched and tempered to obtain the benefit of boron. These steels offer no advantages in the normalized or annealed condition. Effectiveness of boron diminishes as carbon increases. At about 0.90 per cent carbon, no further effect on hardenability is realized.

Difficulties have been encountered in carburizing low-alloy, boron-treated steels. While the core hardenability of a steel such as 80B20 may be entirely satisfactory for a part, case hardenability may not be up to requirements.



Drive gears and pinions in this 27-ton, Walker Bulldog tank are made of Superkore A steel, developed by U.S. Steel Corp. to conserve critical alloying elements. Machinability is good and cost is $25 a ton less than high nickel steel. This alternate was recently adopted as a standard steel by AISI

Practice — It's a good idea to apply carburizing and heat treating facilities to actual parts which can be fully tested and approved before going into production.

Carburizing before direct quenching may decrease the hardenability of the core. Either delayed quenching, based on cooling to about 1550° F before quenching, or a conventional double treatment may overcome this.

Carbon vs Alloy — Closer controlled and specialized heat treatment methods are being studied by metallurgists in a trend toward the use of leaner alloys and carbon steels in some applications.

Example: Following more than three years of laboratory work and road testing, Chrysler Corp. has replaced furnace-hardened, alloy-steel, rear-axle drive shafts on light trucks and taxi cabs with induction hardened shafts made of plain carbon steel.

Alloy steels previously used for rear axle drive shafts in this application were AISI-SAE 4063 and 5160.

Grade 5160 replaced 4063 when restrictions were placed on the use of molybdenum early in the Korean war.

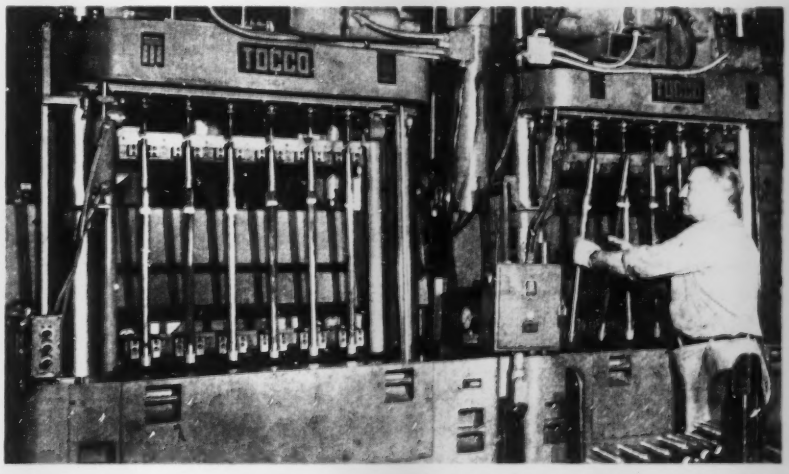
These two steels were furnace hardened, oil quenched and tempered. The plain carbon steel which replaces them is grade AISI C-1037.

Performance — Principal reasons for Chrysler's adoption of induction-hardened, carbon steel as a rear axle shaft material: 1. Higher resistance to bending fatigue; 2. Adequate torsional strength; and 3. Lower cost compared with alloy steel.

In laboratory tests, induction hardened, rear axle shafts showed an increase of 60 per cent in resistance to bending fatigue over furnace-hardened shafts made of alloy steel.

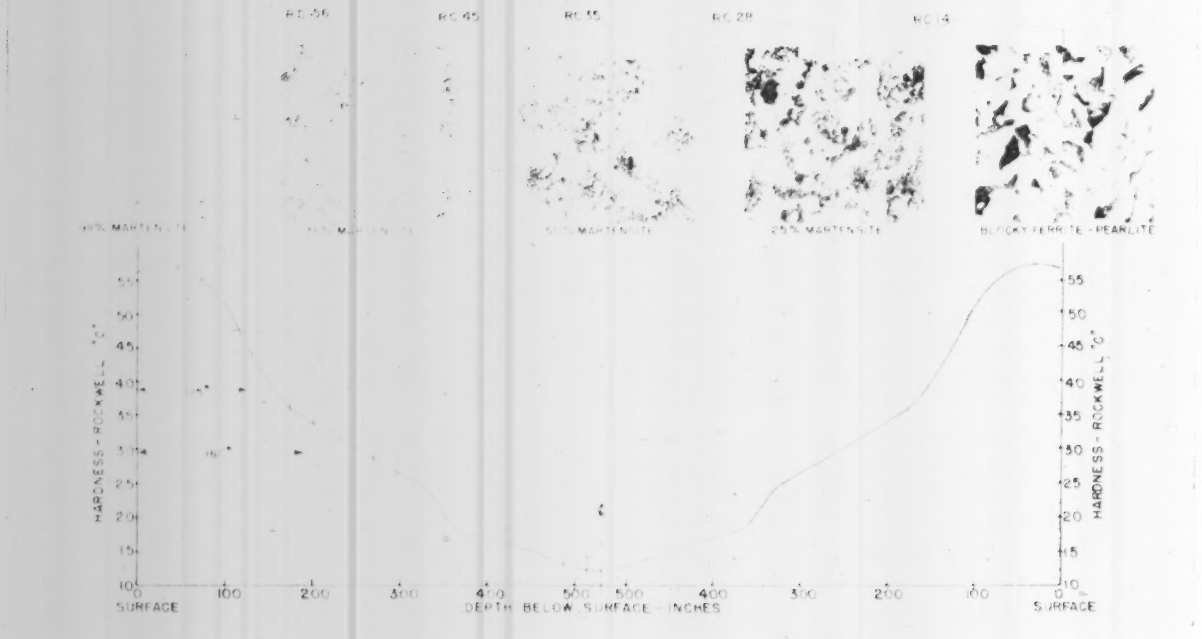
Results of 265,000 miles of road testing (18 different vehicles were operated under extremely severe overload conditions) correlated with laboratory findings. In road tests, induction hardened shafts demonstrated adequate torsional strength.

Use of carbon-steel, rear axle shafts in place of alloy steel shafts gave an appreciable saving in material cost. Processing costs have also been reduced through elimination of annealing, tempering, and shot peening operations. In addition, induction hardened shafts are more easily machined.



Induction heating units used to harden C1037 carbon steel rear axle drive shafts at Chrysler Corp. Alloy steel previously used was 4063 and 5160, furnace hardened. Each of the 125-kw, 3000-cycle units hardens six axle shafts per run. Body of shaft has hardness of 50 RC

Microstructure and hardness of induction hardened C1037 axle drive shafts substituted for alloy steel . . .



TEST RESULTS at Chrysler Corp. indicate that effective case depth on induction-hardened, AISI-C1037, axle drive shafts should be 0.180-inch minimum. Effective case depth in this instance is interpreted to mean the point at which the metallographic structure is 50 per cent martensite.

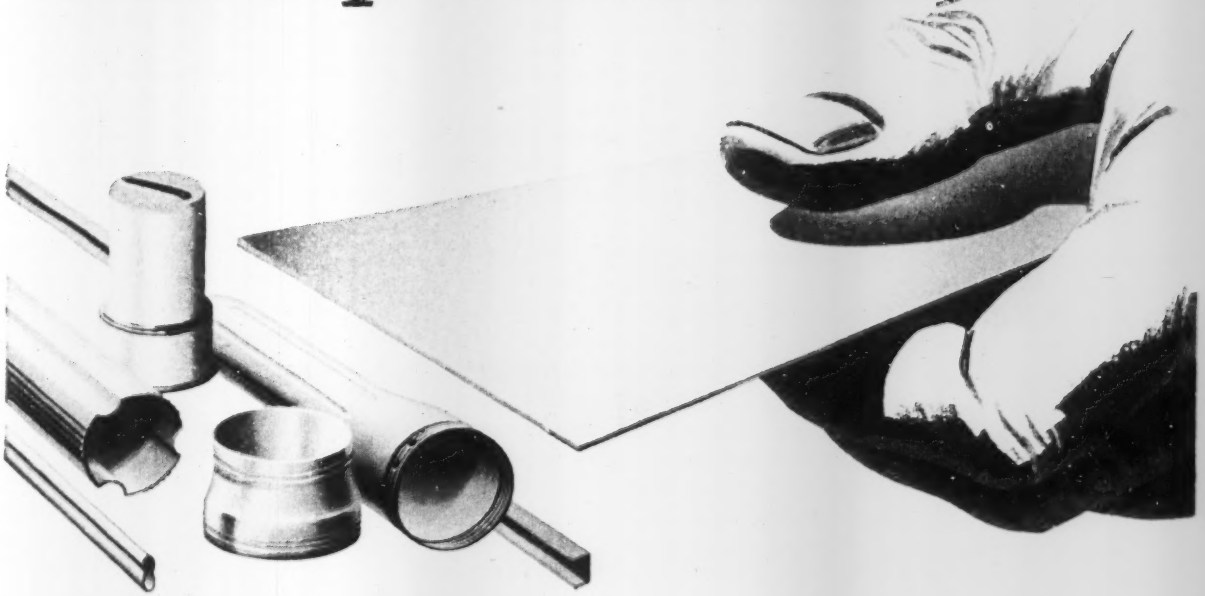
In terms of hardness, the surface and first 0.100-inch is Rockwell C 50. At depth of 0.125-inch hardness is Rockwell C 45. From this point inward, hardness will drop to Rockwell C 35 (50 per cent martensite hardness) at 0.180-inch below the surface, and will taper out, depending upon hardenability of the material, to about 0.280-inch.

Case depth is measured on samples cut from the smallest diameter of shaft. This minimum case depth and hardness gradient is required to meet the specified static torsion yield strength of 24,000 inch pounds. Above graph made from a transverse sample taken from the small diameter of an axle shaft illustrates the requirements.

Hardened depth pattern at the key way end (inset) must be such that it will be deeper than the keyway. After heat treatment of shafts, keyway or tapered end of the shaft is tempered for 14 seconds, to permit cutting the keyway. Keyway is 0.21867-inch deep and the structure at its bottom contains 40 per cent martensite with a hardness of about Rockwell C 25.

Case depth requirement is necessary at this point to prevent sloppiness between the key and keyway due to batter which will occur if the keyway is softer.

Here's a production idea that cuts costs...improves products... Thomas pre-coated strip



Thomas Cold Rolled Pre-coated Strip steel is more than a quality product—it's a production idea that helps reduce costs—speeds operations and makes a better finished product.

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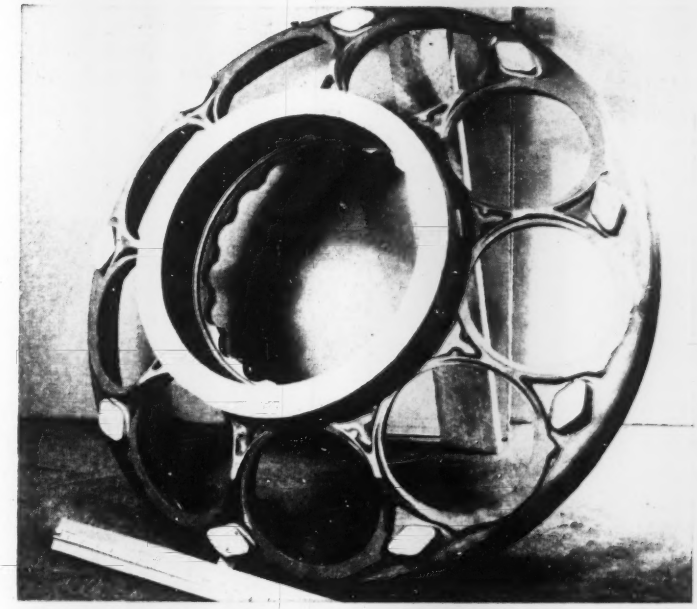
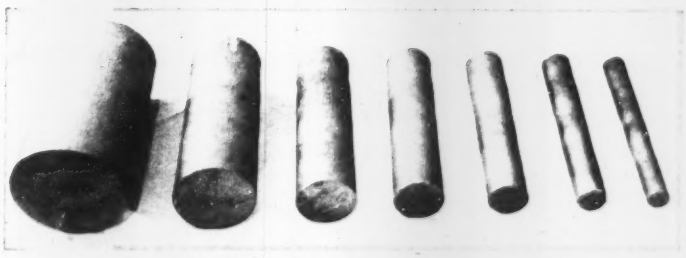


J-48 Jet engine burner support casting produced of ductile iron



Ductile iron bar stock was announced this month. Aircraft plants are machining intricate jet engine parts out of as-cast ductile iron bars

Ductile Iron

High yield point and good castability open up new applications for spheroidal graphite cast iron

THERE is a marked potential for creating new applications for foundry products in ductile (nodular) iron—a special gray cast iron with the graphite occurring in rounded spheroidal form.

For many products ductile iron combines the process advantages of cast iron and the product advantages of steel. It has good fluidity and ability to fill intricate molds. Wear resistance of ductile iron parts is equivalent to gray iron, cast steel and bronze castings. Fatigue resistance is in the race with ordinary steels in both notched or unnotched condition. High yield point gives it a favorable strength weight ratio.

Two grades of ductile iron are pearlitic and ferritic. Pearlitic is obtained in the as-cast condition. It usually requires no heat treatment, although it may be heat treated to higher strengths and hardness. Ferritic can be obtained by an annealing heat treatment of the pearlite grade.

Here are some places where ductile iron is being used: High pressure hydraulic machinery, gears, cams, bearings, blast furnace parts, annealing pots and boxes, crankshafts, clutches, brakes, dies, rolls for steel mills, diesel heads for pistons, pipes and fittings and a variety of machine parts.

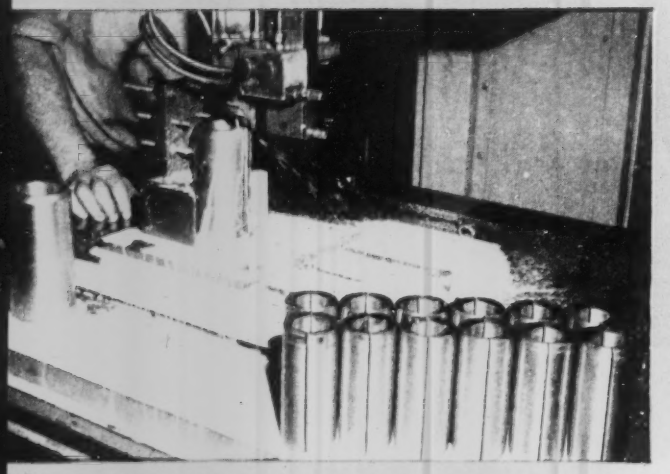
Bar Stock — Howard Foundry Co., Chicago, announced this month they are producing ductile iron bar stock. Compared with cast iron bar stock, due to the nature of ductile iron, center line shrinkage was difficult to overcome.

Howard reports their production bars are sound and will pass x-ray inspection for density. As-cast properties of the bars: Tensile strength, 100,000 psi; yield, 65,000 psi; elongation, 3½ to 4½ per cent; brinell hardness, 245. Bars can be heat treated for greater elongation and hardness.

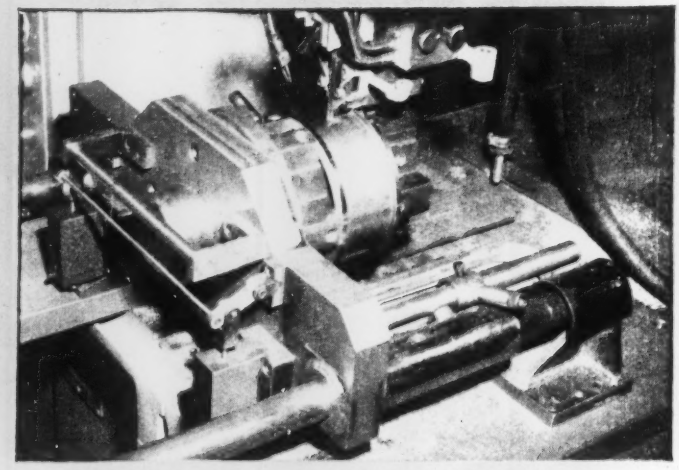
Ductile iron machines well. Bars can be used in maintenance production or specialty work in such applications as pins, bushings, shafts, bearings, seals, and valve guides. Aircraft plants are machining intricate thin oil pump bodies and covers for jet engines out of as-cast ductile iron bars.

PRODUCTION

Low Cost Answer to Many Operations



SLOTTING Slotting bushings, using fixture and special heavy gage DoALL Saw Band to produce desired slot width.



SLITTING Cutting heavy duty bearings in half. Adjustable fixture handles parts up to 11" dia. x 14" length.

Blade speed indicator

Blade tension indicator

Table feed speed control

Table feed pressure control

Blade speed control

Blade welder

Speed-feed-blade selector

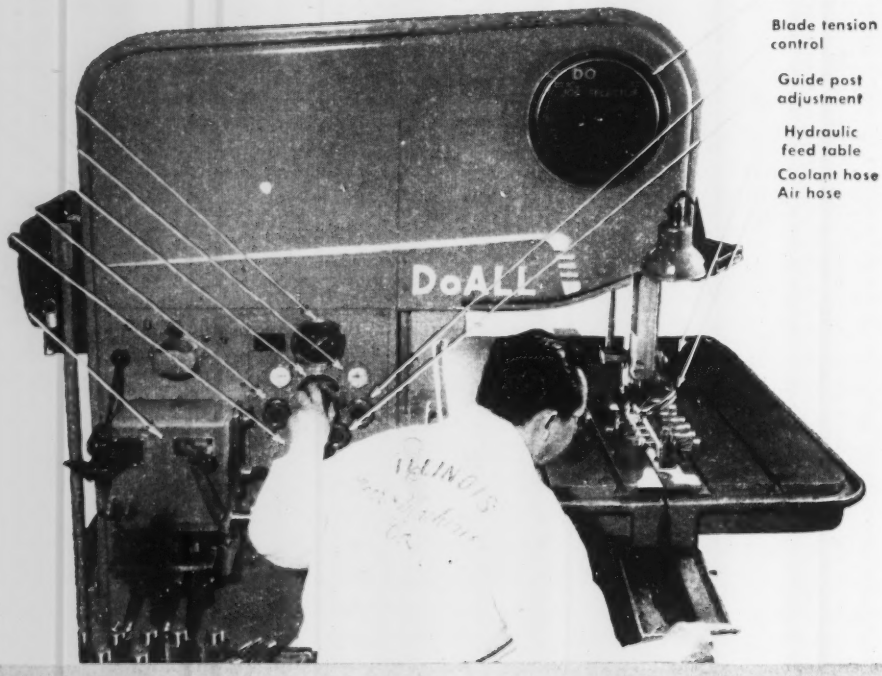
Blade tension control

Guide post adjustment

Hydraulic feed table

Coolant hose

Air hose



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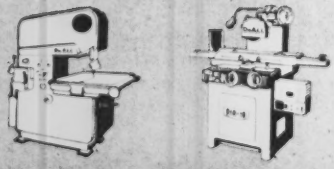
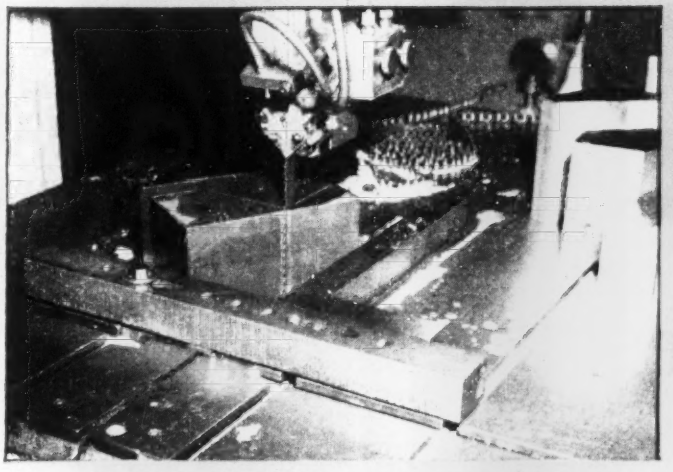


MACHINE TOOLS

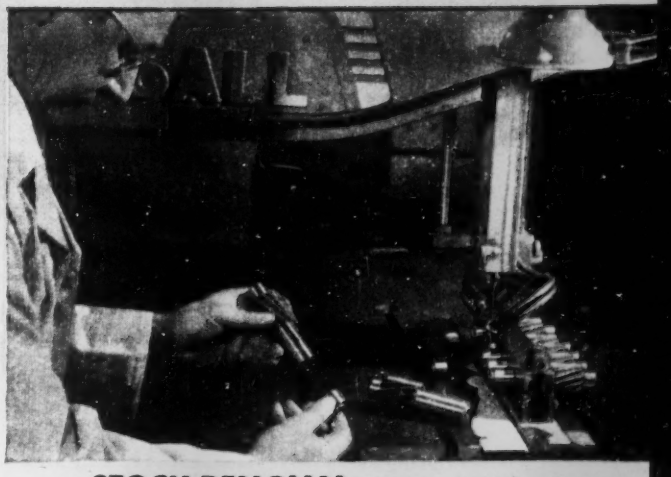
CUTTING TOOLS

BANDSAWING

on Runs of Identical Parts



ANGLE CUTTING Back-up bar is bolted to saw table. An angle is bolted to back-up bar. Fully adjustable.



STOCK REMOVAL Excess stock required to hold pinions in gear cutter being removed automatically.

Use of Simple Fixtures Often Lets Bandsawing Replace More Costly Machining Methods

HOW the use of simple fixtures bolted to DoALL power feed bandsaw tables extends the usefulness of the machines in mass production work can be seen from the accompanying illustrations. Many jobs that would otherwise be performed on slower, more expensive machine tools are now being done on DoALL machines because of the user's ingenuity in devising fixtures.

The versatility of the DoALL Contour-matic makes it the preferred machine for production sawing. Variable hydraulic table feed, automatic stop, adjustable pressure coolant flow, adjustable pressure air flow to blow chips away from cut, blade speed range from 10 to 40,000 fpm, band tension control—these are a few of the features of this production machine.

To take advantage of the production economies possible with band machining, call your local DoALL Store, or write:

The DoALL Company
254 N. Laurel Ave., Des Plaines, Ill.

38 Sales-Service Stores to Serve You—See Your Phone Directory
See DoAll Equipment at The Metal Show in Cleveland Oct. 19-23

8-18

GAGING EQUIPMENT

INDUSTRIAL SUPPLIES

Sharon Steel Corp.

Nickel-stretching and special-purpose alloys brighten outlook for . . .

Stainless Steels

NICKEL bearing stainless steel, popular but hard to get, may remain in short supply for an indefinite period. Although nickel is showing signs of easing, no great spurt in supplies is anticipated.

There has been considerable pressure on government agencies to decontrol nickel by October 1953, but it now appears that this will not be accomplished in the immediate future. Office of Defense Mobilization has announced its desire to study additional data on the effects of decontrol prior to making a decision.

Nickel stainless grades consume almost half of the U. S. nickel supply. National defense demands on nickel are high and come first. Nickel, among the first metals to be placed under control, is the last to be released. This indicates that in a future emergency it would be among the first to be restricted.

Worthwhile—With the availability situation in mind, a good, long-term alternate is well worth the attention of the materials engineer. Appraisal of Type 430 ferritic, straight chromium stainless and its modifications shows in most cases these steels are the best available alternates for applications where 302 has been used, but for which the chromium-nickel type is no longer available or permitted.

Included in the 17-per-cent, straight chromium group are regular 430, free machining 430F, welding grade 430T. In other cases, where an austenitic material is imperative or where high-strength, cold-rolled strip is required, it has been necessary to replace nearly all the nickel in the 18-8 type with manganese.

Good judgment must be used in selection of any alternate to versatile 18-8 stainless. Experience over many years has pointed to manganese as the most favorable replacement for nickel in Type 302 within certain limits.

Many tons of an austenitic alloy, containing about 17 per cent chromium, 4 nickel and 7 manganese, have been produced in past years. It has good working properties both hot and cold; 17-4-7 looks like a good alternate to Type 301, especially for high-strength, cold-rolled strip.

302 Substitute—A slightly higher nickel and manganese content, such as 18 per cent chromium, 5 nickel, and 8 manganese, stands a good chance of filling the bill for an alternate to 302 in the high manganese range. Experimental work is progressing along such lines. Nickel requirements would be only about one half that required for regular 18-8; when emergency necessitates, it would permit doubling of normal chromium-nickel, stainless steel supply with no greater amount of nickel.

Producers feel that these modifications will have to be tried over a wide range of applications to establish their acceptability as alternates to 301 and 302 from the standpoint of production and fabrication as well as ultimate use.

Budd Co. has successfully used many tons of an austenitic alternate, containing 1 per cent nickel—maximum as allowed by government regulations. Known in the trade as TRC, it has approximate composition: Chromium 15.0 per cent; Carbon 0.10 max; Nickel 1.0; Manganese 16.5; Nitrogen 0.15 (See STEEL, p. 94, Mar. 9, 1953).

Many producers are now looking at TRC as an interim product. As such, it has served a useful purpose. But producers feel a bet-

ter all around alternate can be developed with nickel in the 4 to 5 per cent range.

Mechanical Properties—Manufacturers accustomed to the 18-8 grades will find certain differences in 17-per-cent, chromium steel. Elongation value of type 302 is almost twice that of type 430. In the 17-per-cent, chromium grade, smaller spread between tensile and yield strength reduces the range of plastic deformation. These differences make modifications necessary in some fabricating practices when type 430 is substituted for 302.

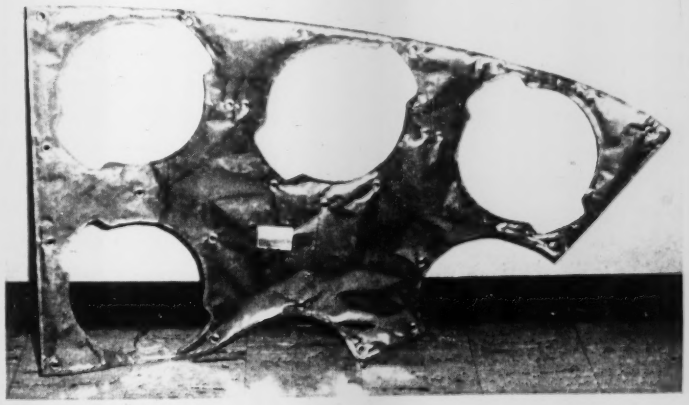
Equally important from the design standpoint, however, is the fact that unlike type 302, type 430 and its variants do not work harden to any considerable extent. This is a distinct advantage if the material is to be spun, but for drawing and forming operations, certain difficulties arise.

Temperature Effects—Type 302, unlike many metals, remains ductile at extremely low temperatures. Type 430 and other chromium stainless steels do not have this advantage. At slightly below room temperature, fracture exhibited by type 430 changes from a ductile type to a brittle type. It stands to reason this straight chromium grade cannot be employed for low temperature use where impact resistance is a factor.

Performance at high temperatures is much more favorable. Type 430 has high resistance to scaling and oxidation at high temperatures. It resists destructive scaling up to 1550° F. However, type 430 and its modifications do not have the high strength at elevated temperatures characteristic of the 18-8 stainless steels.

Magnetic Properties—Unlike the 18-8 stainless steels, the 17 per cent chromium types are magnetic. Depending on exact analysis, annealed permeability may vary from 400 to 1900, compared to a 1.02 maximum for annealed type 302. Because of its magnetic properties, type 430 and its modifications should not be used where a nonmagnetic material is needed.

Welding—Type 430 stainless can be welded by any method except forge welding. However, welded joints may be somewhat brittle at room temperature. Annealing



Stainless steel in thicknesses of 0.002 and 0.004-inch is used for jet blankets in some aircraft. Between sheets of this near-foil thickness is packed a layer of asbestos or fiberglass. It carries the heat of the engines away from the pilot

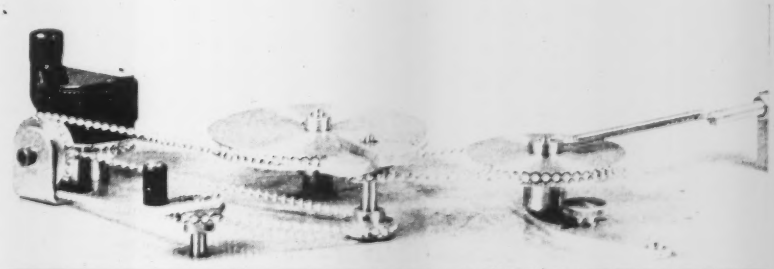
OTHER applications for thin gage stainless: Weather stripping; store fronts; fireproof doors; architectural panels; outdoor movie screens (bonded to plywood); radar; radio and television equipment; camera components; spring fingers for oil seal enclosures; spring washers; antenna leaf; diaphragms; jewelry; automotive radiator fins; proximity fuses; and jet aircraft tail assemblies.
One producer, Washington Steel Corp. is making "Veri-Thin, MicroRold" stainless steel sheet and strip to the following specifications:

18-8 Grades

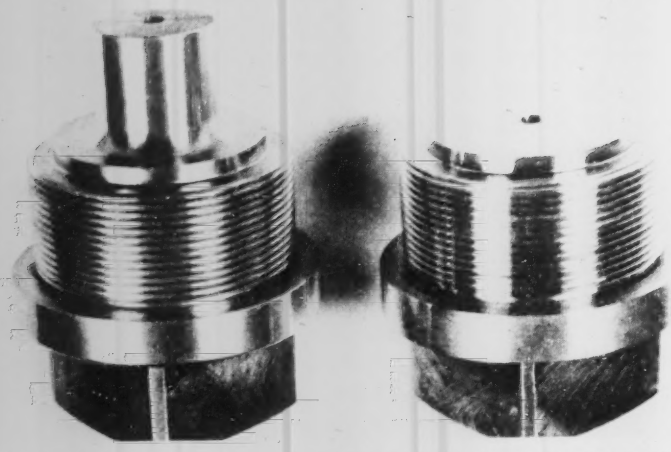
36" wide sheets	0.006 to 0.009-in. thick	2B or 2D Finish
30" wide sheets	0.004 to 0.009-in. thick	2B or 2D Finish
24" wide max.	0.002 to 0.009-in. thick	Bright Annealed

Type 430

30" & 36" widths	0.009-in. thick	2B Finish
24" max.	0.002 to 0.009-in. thick	Bright Annealed



Precision stainless steel strip produced by Wallingford Steel Co. is used by Bead Chain Mfg. Co. in making this bead chain suitable for a positive drive sprocket. It is replacing gear mechanisms on T-V tuners, air conditioning units, business machines, venetian blinds, and is used on timing units of appliances



Valve plugs made from Armco 17-4 PH stainless rod and hardened by heat treatment at 900 F for one hour. This material can be used against Type 316 stainless without galling

around 1400-1500 F helps to alleviate the brittle condition. It will not correct grain growth, and as a general rule, weld will not be restored to the full ductility of the base metal.

Use of type 430T, frequently referred to as 430Ti, gives better weld ductility. Titanium contained in this grade inhibits the formation of martensite by welding heat. Type 430T welds are fairly ductile in both the as-welded and annealed conditions.

Save Here — Straight chrome types buff and polish readily. In many cases, bright rolled finish of the 400 series is satisfactory perhaps with a superficial buffing. Since a bright rolled finish is not available in type 302, finishing operations can actually turn out to be cheaper when working with 430.

Corrosion resistance of type 430 and its modifications is good. Although it may show some tarnish or discoloration under certain conditions, it is quite satisfactory for utility.

Results of five year outside exposure tests on straight chromium and 18-8 type were recently reported by Armco Steel Corp. Conclusions drawn: "Type 430 stainless steel has good atmospheric corrosion resisting properties. It will give a good account of itself in normal outdoor service, except along the seacoast".

High-Workability Stainless Steels—Broad application is foreseen for a new stainless steel that makes possible economical, mass production of severely cold headed and upset fasteners and other parts. Known as Carpenter No. 10, steel is a modified-austenitic, 18-8, chrome-nickel stainless that work hardens slower than any of the conventional 18-8 analyses. General type analysis is: Carbon 0.08 per cent max; Chromium 16.00; Nickel 18.00.

Uses for the steel: Fasteners, cold headed bolts, screws, upset nuts, instrument parts, etc. It is also good for blanking, forming and jobs involving severe coining, extruding and swaging.

No. 10 has another valuable property: It is useful for parts that must remain nonmagnetic after severe cold working. After a 50 per cent reduction, with a field of 200 Oersteds, permeability is approximately 1.002. After an 80 per cent reduction, permeability is about 1.018.

Hot Workability — Recent tests have brought to light new facts on the effect of rare earth oxides and misch-metal on the hot workability of austenitic stainless alloys in mill operations.

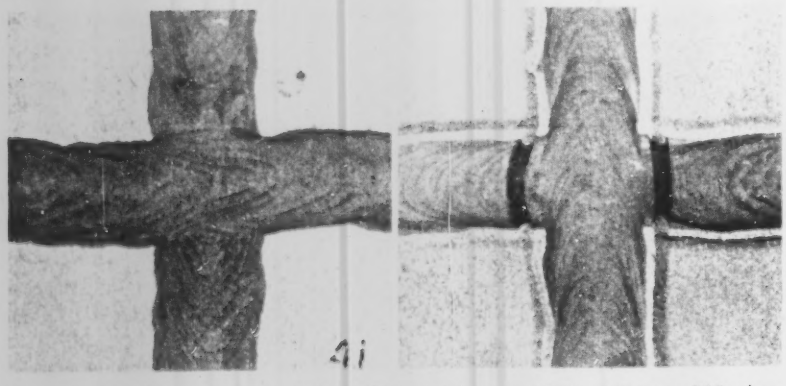
These rare earth metals and compounds are giving increased output of products from hard-to-work, high-alloy, stainless steels used in corrosion and heat resistant applications. With prospect of relaxed controls on nickel near, use of these rare earth additions promises even more benefit.

Resists Sulphuric—A sulphuric-acid-resisting stainless steel, Carpenter No. 20, which has approximately the same composition as Durimet 20 castings, is now available in bars, tubing, sheet, strip, plate and wire.

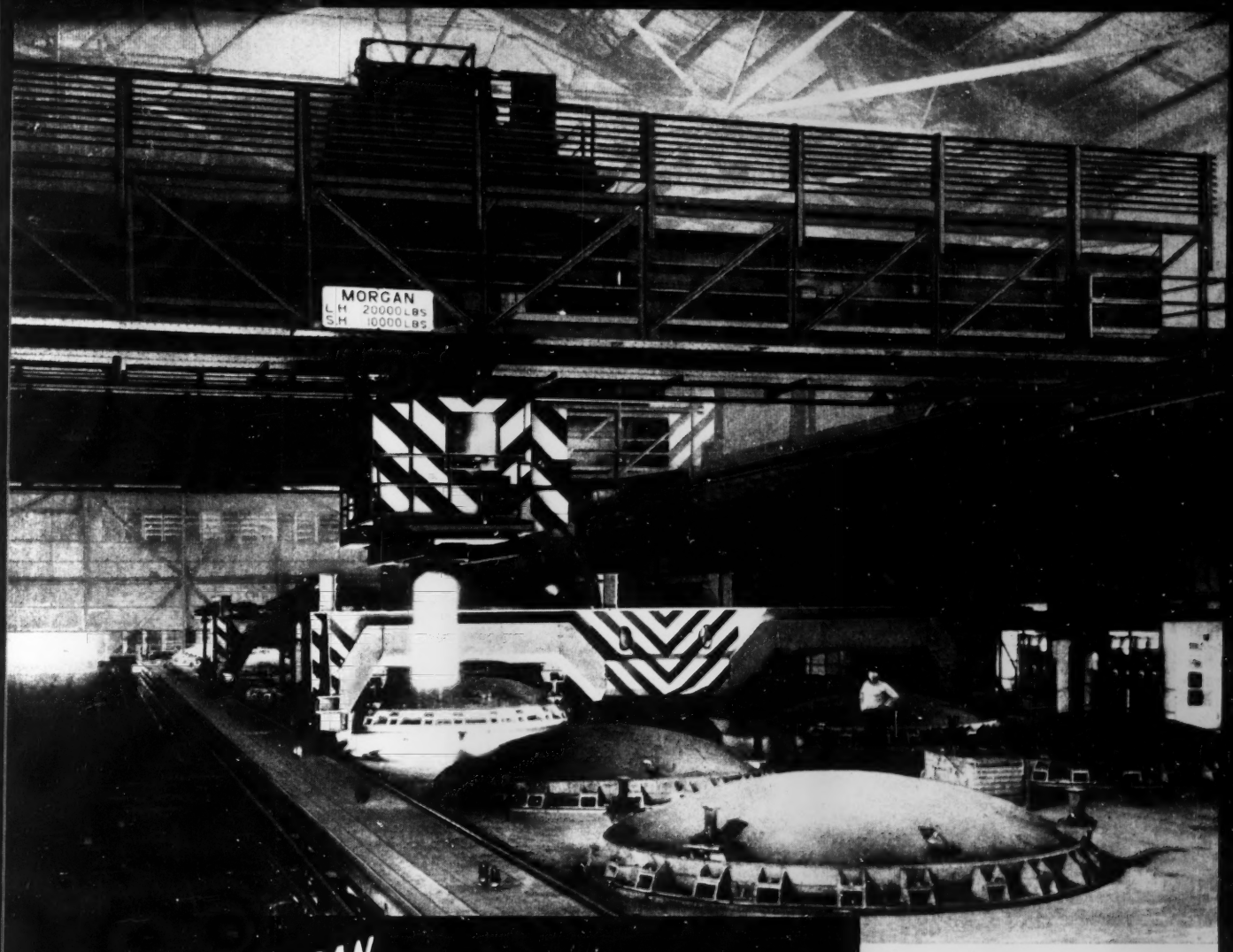
In many corrosive applications this special No. 20 gives increased equipment life, and reduces cost of fabrication as well. Typical applications: Pump shafts and rods, valve stems, bolts, nuts, washers, tie rods, pickling racks, and spray pickling equipment.

Precipitation Hardening—Development of two types of precipitation hardening stainless steels has extended the field of application for stainless steels.

Armco 17-4PH and 17-7PH stain-



Specimen (right) was made of Type 304 stainless, welded with type 308 electrode. Note corrosion alongside welds and on bead. Specimen (left) is Type 304L (extra low carbon) welded with a Type 304L electrode. There is no evidence of corrosion



BUILT BY MORGAN *Engineering*

MORGAN CRANES AT PUEBLO

Illustrated is one of two Morgan 10-ton, 7-motor, 94'5" span Soaking Pit Cranes at The Colorado Fuel & Iron Corporation's Pueblo Works. These cranes have a tongs range of 15"-30". All motions on trolley are through worm reduction units. The trolley frame, bridge trucks and ram are fabricated and welded into one-piece units.

Morgan has followed very closely the development of soaking pit cranes from the first tower and rack type to the present modern low stiff leg type built with or without counter-weights. Send for Bulletin 32-A.

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less steel have the combination of good corrosion resistance, high strength and hardness, and good fabricating properties. These alloys are heat treated in range of 850 to 1400° F; this minimizes many heat treating problems.

The 17-4 PH alloy can be heat treated at 850-900° F, to a Rockwell C hardness of 40 to 45, an ultimate strength of 190,000 to 210,000 psi and a yield strength of 170,000 to 200,000 psi.

In the soft temper condition, 17-7 PH sheet, strip and plate can be deep drawn or severely formed and then hardened to high strength and hardness. When heat treated to develop maximum strength, 17-7 PH condition TH will develop: Ultimate tensile strength 185,000 psi; 0.2 per cent yield strength-165,000; Elongation, per cent in 2-in., 6; Rockwell hardness C41.

Wire—In wire form, 17-7 PH stainless offers a combination of high corrosion resistance and strength and elastic properties comparable to high carbon spring steels. Heat treated springs have a much higher set resistance than 18-8 springs.

After coiling springs, hardening is accomplished by heating one hour at 900° F, followed by air cooling. In this condition, 17-7 PH exhibits elastic properties at room temperature like those of the best music wire and alloy spring steel.

U. S. Steel Corp. has developed a precipitation hardening 18-8 stainless called Stainless W. This ferritic alloy can be heat treated in all wrought and cast forms to give a range of mechanical properties similar to that of the cold worked austenitic 18-8 steels. Variation of mechanical properties is brought about by varying either solution annealing temperature or aging temperature and time, or both. Other stainless producers have experimental work going on in the precipitation hardening field.

Extra Low Carbon—By providing lower over-all cost, compared with stabilized grades, as well as greater corrosion resistance adjacent to welds, extra low carbon grades are now widely used for welded stainless steel structures.

Even more important in periods of material shortages is the fact that these grades do not require critical columbium, or tantalum stabilizers, to prevent harmful carbide precipitation due to welding.

Valve disc (left) and compressor casting (right) produced in Cooper Alloy Foundry Co.'s new V2B stainless alloy

Long Term Prospect Is Good—A new grade of "Simplex", extra low carbon ferrochrome developed by Electrometallurgical Co., promises to make it cheaper to produce the extra low carbon grades. Vanadium Corp. of America is also getting into production with an extra low carbon grade of ferrochrome. For many applications, the low carbon grades of stainless provide a satisfactory material at lower cost.

Extra low carbon grades have a maximum carbon content of only 0.03 per cent as compared to about 0.10 per cent for regular grades. This exceptionally low carbon content prevents harmful carbide precipitation during welding and possible intergranular corrosion at weld areas.

ASME's Boiler Code committee issued a special ruling a short time ago permitting use of the extra low carbon grades of austenitic stainless steel (Types 304, 316, 317), under the applicable section of their rules for unfired pressure vessels.

New Alloy — High corrosion resistance, hardenability and machinability in the quench-annealed condition are properties of a new stainless alloy, V2B developed by Cooper Alloy Foundry Co. V2B is a hardenable 18-8 type containing copper, molybdenum, silicon, and a small amount of beryllium. Crucible Steel Co. has taken a license from Cooper to produce wrought forms of stainless V2B. (U. S. P. 2,635,044—Apr. 1953).

In the quench annealed condition, the alloy is soft enough to be readily machined. After machining, the steel may be precipitation-hardened by a low temperature heat treatment producing no distortion. New alloy can be produced in the cast as well as the rolled condition.

High hardness and strength, together with good corrosion resistance, plus erosion resistance and nongalling characteristics, suggest applications in parts requiring corrosion resistance such as valve disks, pump impellers, gears and other wearing parts at both ordinary and elevated temperatures.

V2B does not overage at elevated temperatures with resultant loss in hardness. This points toward applications in steam accessories where temperatures may go as high as 1400° F.

Sintered Stainless — If costs for corrosion resistant mechanical parts are too high it will pay you to look into possibilities of sintered stainless steel parts. Developments in stainless powdered metallurgy are now far enough advanced to make the process feasible for many applications.

Stainless powder is used for components such as gears, levers, cams and other parts which are difficult to machine economically from bar stock. Raw material cost is higher than bar or sheet stock. However, the amount of material used per part is usually less since there is negligible scrap loss and little, if any, machining.

Stainless powder metallurgy parts can be machined. Boring, turning and other operations are done on routine basis with carbide tools.

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5% Cr — air hardening

NO. 2

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4% Cr — 1% C

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9.50% W — 3.50% Cr

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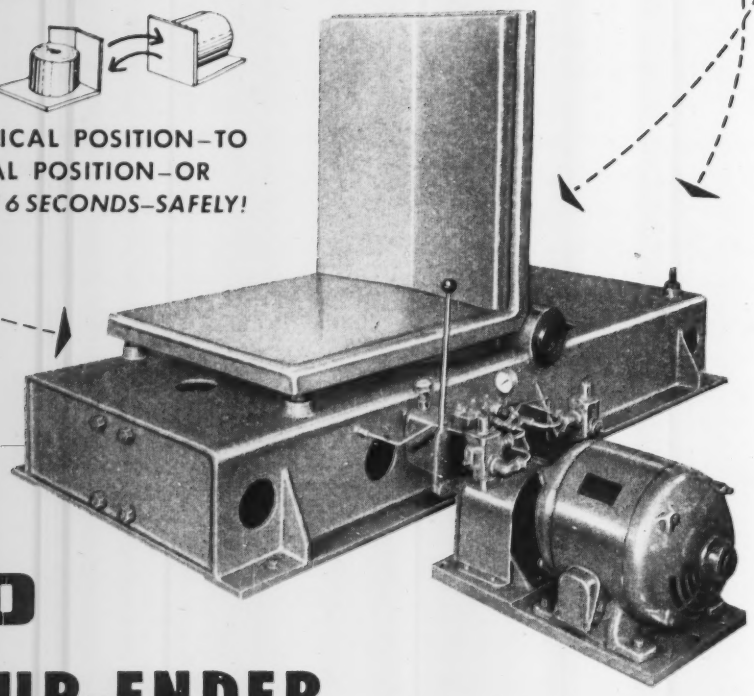

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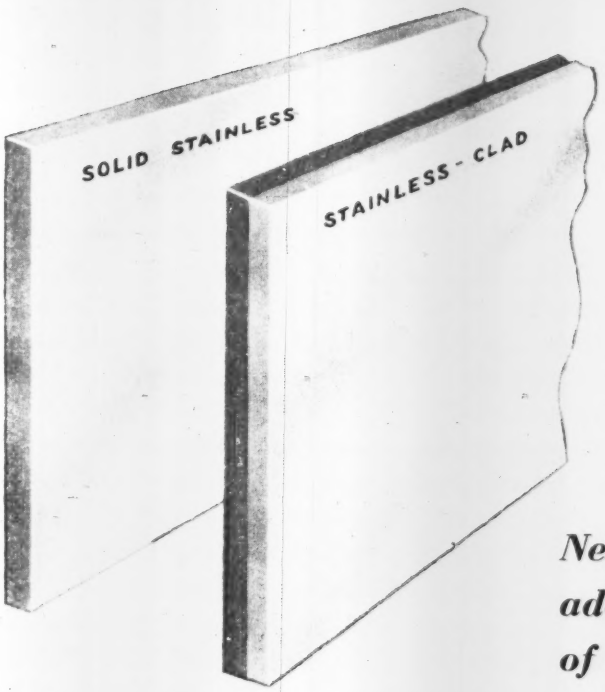

Clad Steels

New economy and complete adaptability in a variety of applications

THERE are many reasons for using clad steels. One of the most important: They are less expensive and yet have the same corrosion resistance properties as the solid cladding metals.

There are some cases, however, where clad steels cost more than the solid cladding metals, but their use is justified by some other desirable property.

Other factors that have influenced the use of clad steel plates are lower cost fabrication and ease of welding, increased strength and improved thermal conductivity. Of importance also: Conservation of scarce metals such as nickel and chromium in emergencies.

Weld Together—A clad steel—plate, sheet or strip—is made by rolling two or more different metals together to produce a permanently-bonded, bi-metal material. The "sandwich" so produced can be bent, twisted, punched, and formed like a plate of a single metal.

Relatively thin surface layer of corrosion resistant material is joined to a backing plate of carbon or alloy steel, giving it strength and rigidity with economy.

Clad steel plates are generally specified in the order of 10 or 20 per cent of the total plate thickness, but percentages from 5 to 50 per cent have been produced. Clad steel plates are now available up to 5 inches thick. Steel backing selected may have low or high temperature properties of molybdenum or nickel steels or may be a standard or high tensile material.

First—Nickel clad steel was the first clad product, pioneered by Lukens Steel Co. some 20 odd years ago. Since then, Monel, Inconel, stainless, and copper clad steels have been added and are now commercially available.

Recently, Lukens worked out a process for manufacturing aluminum clad plates; studies are being made of clad steels fabricated with scarce and high-priced metals such as tantalum, zirconium and titanium. Eventually they may join the other special metals, such as silver, that have been used in the cladding process to make scarce, high-priced material go further.

Range—Since stainless clad steels perform the same function as solid stainless, they have been widely used in many corrosive environments. Here's what one producer makes: Jessop Steel Co. turns out stainless clad in the range of 10 to 50 per cent total stainless. Included are AISI types 304, 316, 347, 321 and 310. These grades are also produced in the extra low carbon analysis. Stainless clad plates are also produced in types 405, 410, and 430 straight chromium stainless steels.

More—Superior Steel Corp. produces low carbon deep drawing strip steel, clad on one or both sides with copper, red brass, bronze, nickel or cupro-nickel. These cladding metals are bonded inseparably to the steel base in thicknesses of 10 to 15 per cent of the overall thickness.

Other Superior clad products: 430 stainless on low carbon steel, 15 per cent cladding on both sides; copper on one or both sides of 430 stainless; low carbon steel clad with 430 stainless on one side and copper or bronze on other side. Under development is low carbon steel coated on both sides with 300 stainless steel.

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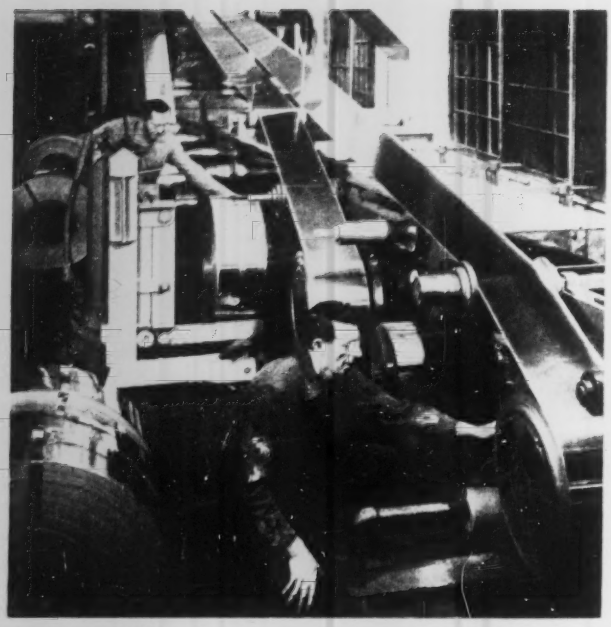


Thomas Strip Division
Pittsburgh Steel Co.

Precoated Metals

New starting point for production economy in a wide range of metal combinations

MANY manufacturers first became acquainted with precoated steel strip in World War II. Since then they have found that precoated steel of one type or another is a short cut to better appearance and improved corrosion resistance on many products.

Economy and strength of steel are combined with the functional properties of nonferrous metals. A complete line of precoated strip steel is available in a variety of sizes, widths, gages, tempers and finishes (see list). Precoated metals are produced in base metals other than steel including zinc, brass, copper and aluminum.

Pays Off—Precoated strip allows manufacturers in many instances to skip preparation and plating costs and concentrate on fabricating and assembling. Material works smoothly through dies and intricate forming rolls.

Fabricator has the advantage of corrosion resistance both during processing and in the finished article. In many cases, the surface supplied by the precoating is all that is required; in other instances, the precoating makes a ready base for further plating or painting.

Precoated strip can conserve nonferrous metals. For example: Copper electroplated over cold-rolled strip can save as much as 95 per cent of the pure metal in such things as tubing and ammunition. Similar savings of nickel are being made on many electronic parts. More and more precoated strip is going into automotive parts, electrical appliances, hardware, household fixtures and office equipment.

More Than You Think—Brilliant, prefinished metals in sheets or coils are available in ready-plated form with chromium, nickel, copper or brass from American

Typical parts produced from American Nickeloid, preplated chrome steel. Center (left to right): furnace handle, dial plate for bathroom scale, ash tray, gas tank cap, name plate, and two switch plates

Nickeloid Co. And look at the range of base metals: Steel, brass, copper or aluminum. Preplated metals can be had in bright and satin finishes—stripes, crimps and embossed designs.

Nickeloid preplated finishes are available with protective coatings of a paper type adhesive or plastic film to aid in fabricating and handling of the product. Copper and brass finishes are lacquered.

Manufacturer of deep fat fryers made a savings of 50 per cent in the use of preplated chrome steel for the wrap-around section as compared with the plated after method. Manufacturers of broilers, rotisseries and deep fat fryers are among the most prominent users of preplated chrome steel.

Help Here—Both hot dip and electro methods are being used to produce zinc coated strip that shows excellent corrosion-resisting and paint-holding characteristics.

Coated strip is available with deep drawing qualities. In fact, properties can be tailored to suit almost any fabrication requirement if complete information is given to the supplier concerning the operations to be used. Present-day zinc-coated steel can be formed without flaking, peeling, powdering or otherwise injuring the coating.

Zinc-coated steel is ideal where lightweight steel sections are required. It resists rust and corrosion, thus prolonging product life—especially on products of thinner, lightweight construction.

Electro, lead-tin-alloy coating makes the most of the well known ability of lead and tin alloys to resist atmospheric corrosion. Alloy's tin content increases atmospheric corrosion resistance, makes the coating harder, and improves soldering and spot welding characteristics. It withstands extreme bending and forming operations without cracking or peeling.

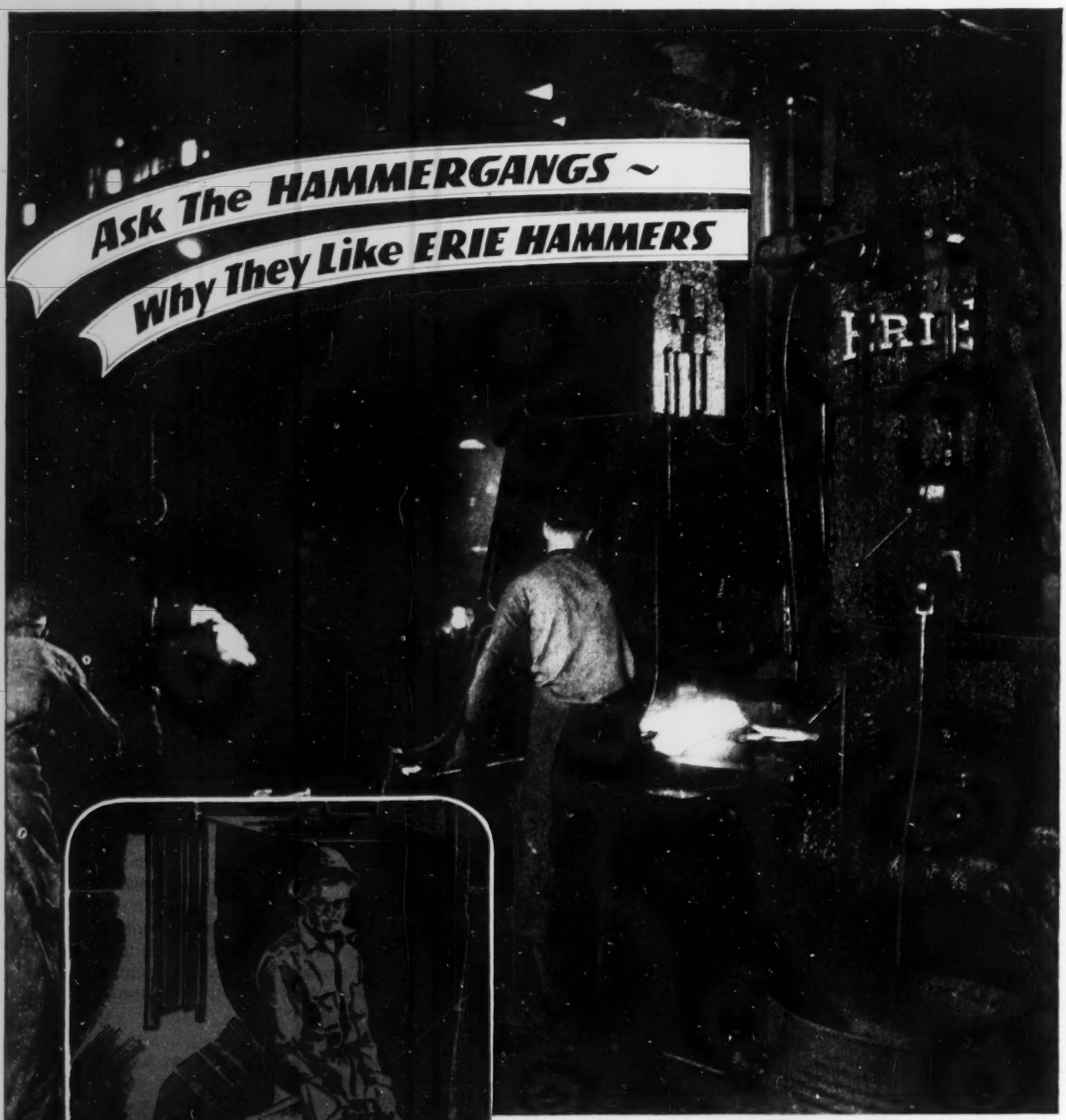
Phosphated, zinc-coated sheets leave the mill in prime condition for painting and require no special chemical treatments.

Newest—One of the newest additions to list of precoated steel strip is an electroplated alloy containing 85 per cent lead and 15 per cent tin. This is being produced by Thomas Strip Div., Pittsburgh Steel Co., in gages ranging from 0.05 inch and widths to 2 inches.

Pre-Coated Strip Products Commercially Available . . .

Copper	A ready base for further plating. Useful for tinning, soldering and brazing. Available in several finishes, including buffed.
Electrozinc	Dense, peelproof coating which adds substantially to product life and appearance. Fabricated parts get lasting protection inside and outside. Product available with phosphate coating to improve paint adherence.
Hot Dip Zinc	Grades are available in uniform temper that can be formed without flaking, peeling, powdering or otherwise injuring the coating. High resistance to corrosion; available with phosphate finish if needed for paint adhesion.
Hot Dip Aluminum	Resists combination of heat and corrosion. Provides heat reflectivity and attractive appearance of aluminum. Will withstand 900° F without discoloration and up to 1250° F without scaling. Special alloying treatment makes it useful up to 1650° F.
Electro Nickel	Retards corrosion, tarnishing and staining. Gives resistance to oxidation at high temperatures. Functional applications in radio, television and electronic equipment. Used for decorative purposes.
Electro Nickel-Chrome	Popular for decorative and protective applications. Used by many manufacturers: Electrical appliances; housewares; stoves and heaters; lamps. Practically all producers of broilers and deep fat fryers use preplated chrome steel for wrap-around section.
Electro Brass	Popular for decorative work. Given a buffed finish can replace more expensive metals. Easily oxidized to a variety of shades, then lacquered for permanence. Some uses: Watch cases; jointures for folding rules; luggage hardware.
Hot Dip Tin and Tin Alloy	Retards corrosion and gives excellent base for soldering. Good foundation for applying more tin or babbitt. Reduces tool wear in forming and drawing operations.
Electro 85% Lead-15% Tin Alloy	Hard corrosion resistant coating with good soldering and spot welding characteristics. Easy to solder after long storage periods. Good base for paints and enamels; no priming coat is necessary.
Lacquer	Available in clear finish or in a variety of colors. Lacquer may be applied on one or both sides of plain cold-rolled or pre-coated strip. Lacquer over phosphated, zinc coated strip gives a bonus in corrosion protection. Many colors can be had for decorative use.

Note: In addition to steel, preplated finishes are available on zinc, brass, copper or aluminum base metals.



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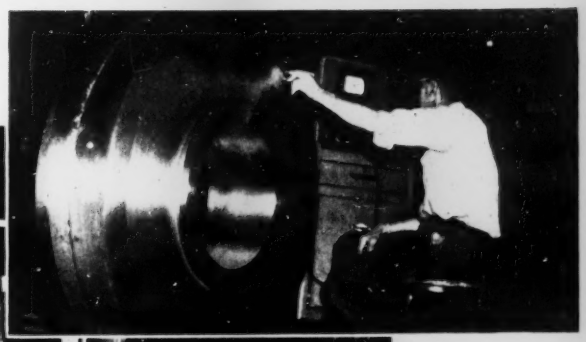
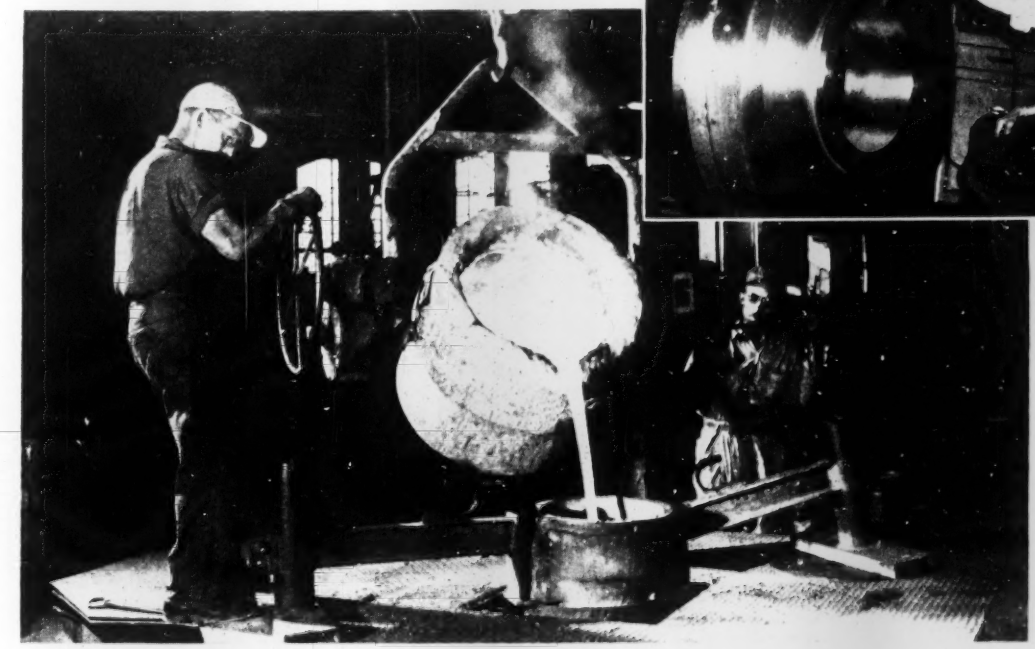
Pouring Ampco metal into large, vertical centrifugal spindle, which has been set into floor for safety. Test picture illustrates use of ultrasonic method





Copper Alloys

New alloys give improved formability and better physical properties. Processing methods are on the march too

SPOTLIGHT in the copper and zinc field is shared by processes and products.

On the process side of the picture, powder metallurgy and die castings are growing in popularity in an expanding area of applications. Metal powders — brass, bronze, copper and nickel silver — are being formed into a host of intricate parts. Zinc die castings are being turned out at an all time high rate. Development of new high temperature alloys for die materials promises to expand the use of brass die castings.

Among alloys being talked about are Telnic bronze, product of Chase Brass and Copper Co., and Formbrite, product of American Brass Co., both of Waterbury, Conn. Important advances are being made in use of beryllium-copper alloys.

Telnic Bronze—This material has been around for some time, but because of its nickel content, its application has been narrow. Once controls are lifted, however, it's expected to make rapid gains, particularly in the electrical industry. Alloy contains 98.15 per cent copper, 1.10 per cent nickel, 0.25 per cent phosphorus and 0.5 tellurium.

Properties combine h gh strength, hardness, high electrical conductivity, corrosion resistance and excellent machinability. Tellurium is responsible for the latter quality, while nickel and phosphorus add to capacity for age hardening or hardening by heat treatment. Electrical conductivity averages 50 per cent of pure copper.

Product is available in round and hex rod forms and is usually furnished in hard drawn or spring temper. Typical applications include screw machine parts and forgings.

Formbrite — Available in sheet and wire strip form, this metal has

a fine grain structure which is particularly adapted to press room products requiring extensive finishing operations. It is stronger, harder and springier than usual drawing brasses, but retains its ductility for forming and drawing and takes sharp, clean ornamental die impressions. It can be used for many drawing brass purposes where initial strength and stiffness are needed.

Currently, it's being manufactured only in brass alloys, but the procedure can be applied to many other copper-base alloys. Average physical properties for 70/30 brass made by the Formbrite method are: Yield strength (0.5 per cent extension under load), 39,000 psi; tensile strength, 63,000 psi; and elongation in 2 inches, 35 per cent. Annealed standard 70/30 brass compares: Yield strength, 22,000 psi; tensile strength, 54,000 psi; and elongation, 50 per cent.

Material is produced as wire for cold heading and upsetting. It's readily adaptable to the Phillips head, fillister head, washer head and ordinary flat, slot-headed wood screws, rivets and other cold-upset products. Supplied in only one temper, it machines well, threads easily by rolling or chasing and gives a surface that resists scratching and abrasion.

Ampco 18—Nominal composition of this alloy produced by Ampco Metal Inc. is 86 per cent copper, 10.5 per cent aluminum and 3.5 per cent iron. Properties include low magnetic permeability, high strength and long fatigue life.

Product has been used for such applications as large, nonmagnetic, inertia fly-wheels, which are driven up to 2000 rpm by Packard diesel engines. In the finished, machined condition, flywheels weigh about 4000 lbs. Physical dimensions: Outside diameter, about 49 inches; bore diameter, 20 inches; and thickness, 11⅜ inches at hub section, 9⅝ inches when measured through remainder of face.

Since wheel must be brought to dynamic balance within 2 oz inches at 390 rpm, structure had to be homogeneous and free of defects. Considerable savings in lead time and cost were realized by centrifugal casting of the product.

Ampco 18 (with heat treatment) in this application had these physical properties: Tensile strength, 90,000 psi, min; yield strength (0.5 per cent elongation), 45,000 psi, min; elongation, percentage in 2 inches, 10 per cent min; and fatigue (100 million cycles), 35,000 psi, avg.

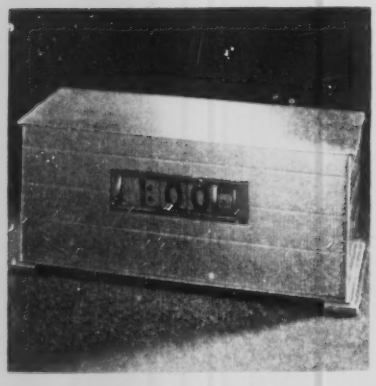
Heat treating procedures followed conventional, high-iron-bearing, aluminum-bronze practice. Since it is possible for flaws to develop during the heat treat, ultrasonic inspection is specified.

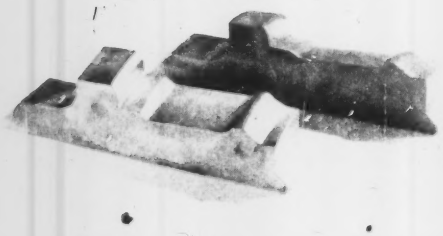
Beryllium — Marked growth is taking place in pressure and investment castings of beryllium-copper alloys. Uses include molds for plastics and rubber, zinc die casting dies and certain mechanical parts requiring dense structure and intricate detail without machining. Investment castings are finding wide applications in instruments, machinery, firearms and aircraft accessories.

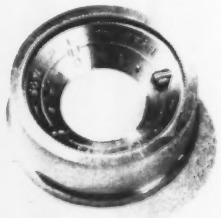
Several new copper alloys of low beryllium content are in the developmental stage. They promise to provide about same strength as standard alloys with increased formability and lower cost. One such alloy is being marketed as beryllium copper tubing, which is used extensively in bourdon tube applications. Research also indicates that ternary copper alloys (with beryllium substantially reduced) may offer certain advantages.

Average Properties of Telnic Bronze

Round Rod:	Temper	Tensile Strength psi	Yield Strength (½% extension under load)	Elongation in 2"	Rockwell B hardness
⅛"	Spring 75%	104,000	92,000	7	95
1"	Hard	72,000	62,000	24	84
Forgings after aging		58,000	38,000		70

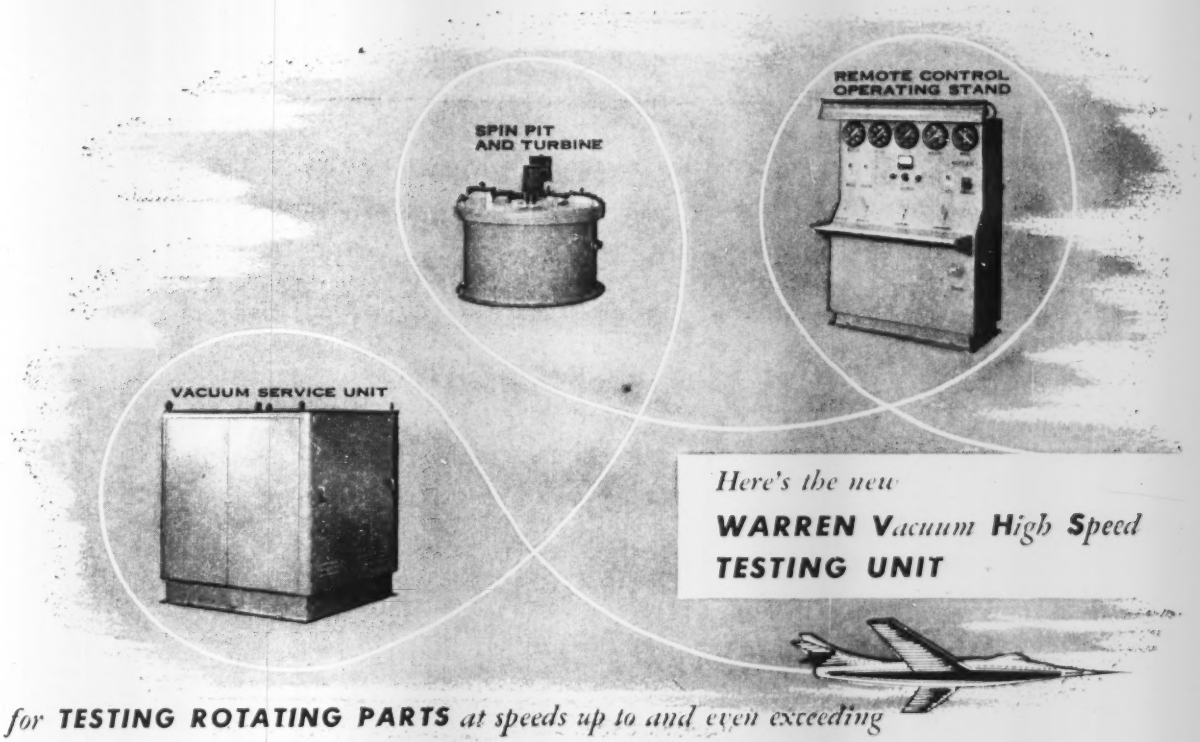






Formbrite is used for this type of product. Brass alloy is available in the sheet, strip and wire forms

Beryllium copper flash rim welding dies, center. Hot-lobbed, beryllium copper mold for plastics, right



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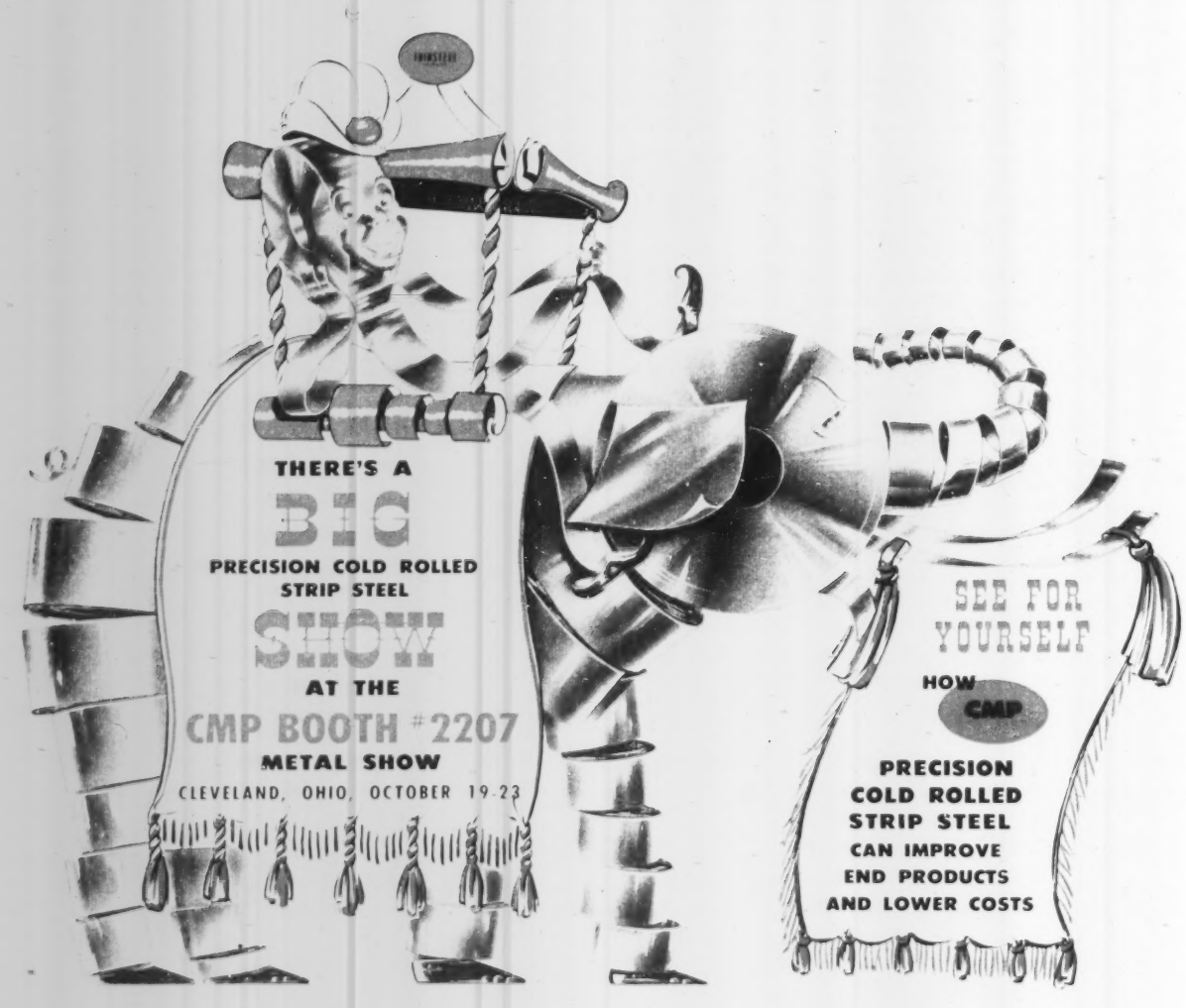

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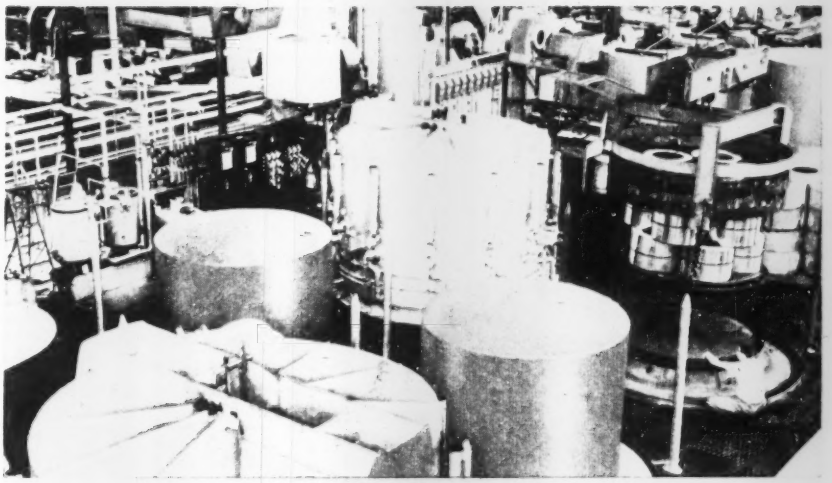


Aluminum cold rolled strip is annealed in a nitrogen atmosphere at Scovill Mfg. Co. to minimize oxide formation and reduce finishing costs. New product will be called Truspec

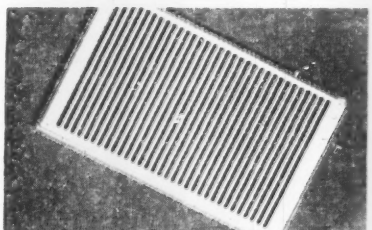
Light Metals . . .

Aluminum, Magnesium, Titanium

New alloys are tailored for specific properties.

STRONGEST aluminum alloy now in use is XA78S, reported by Aluminum Co. of America to be 10 per cent stronger than its strongest predecessor, 75S. XA78S has been designed into one plane now approaching the production stage. Other major airframe manufacturers are giving it the once over.

Two new aluminum alloys particularly designed for welded assemblies are Alcoa A54S and XC56S. Advantage: Section thickness can be approximately one half that required for other aluminum alloys used for similar purposes. Both alloys combine good weldability with high strength and good resistance to corrosion.



Refrigerator shelf fabricated from K155 aluminum alloy sheet Kaiser Aluminum

XC56S is an extremely strong alloy for this type of application. It is best where strengths even higher than demonstrated by A54S are desired. Here are where these alloys are being used: Welded ship superstructures and barges; pressure vessels and heat exchanger shells; liquid and bulk handling equipment.

Sheet Alloys—A new magnesium-type, aluminum sheet for general metalworking requirement is alloy K155. Developed by Kaiser Aluminum & Chemical Sales, Inc., it has same general mechanical properties as the manganese-type alloy 3S. Certain additional advantages result from its magnesium content. Uses: Production line stamping of louvered refrigerator shelves, in light reflectors, meat trays and utensils.

With a nominal magnesium content of 0.9 per cent, K155 in the as-received condition does not have the dark coloration of the high magnesium-containing alloys, such as 52S. K155 is available in plate, flat sheet, coil and circle form in all tempers in the H1 and H3 groups. The H1 temper series is used for applications requiring relatively simple forming.

Stabilized H3 series is recommended where moderate or severe forming is involved. Mechanical property limits are the same as for 3S. K155 is well suited for anodized finishes. Tendency toward structural streaking, is less; the

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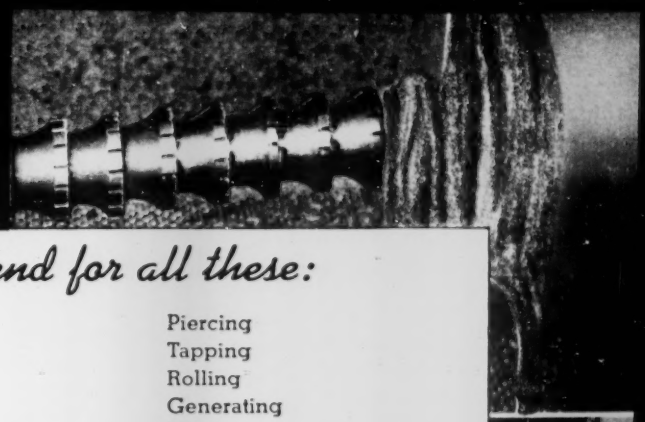

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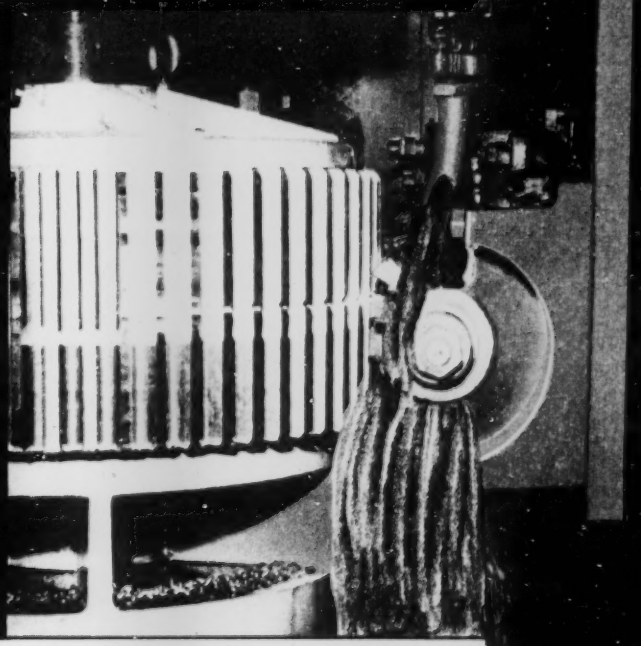

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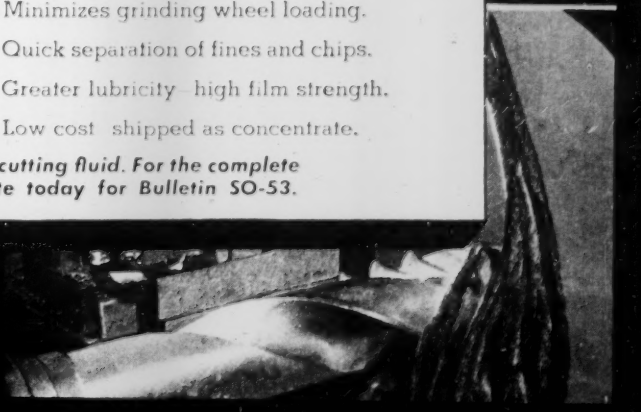


finish is clear and light colored. In architectural use, it closely matches the color of anodized 63S extrusions.

Similar Alloy—For some time the Reynolds metallurgical group has been working on the development of R305, an aluminum-magnesium alloy with properties comparable to Alcoa's A50S alloy and Kaiser's K155 alloy. Like K155, R305 has a lower magnesium content than 50S; also, many of its characteristics are similar to 3S. It is inherently fine grained, meaning it has an edge over 3S where its surface appearance is a major factor after the forming operation.

Reynolds reports that after anodizing, R305 alloy shows a clearer lighter film than either 3S or 52S. Corrosion tests show it to be as good as 3S. It may even be better than 3S in industrial atmospheres. It is now being tested for comparison with 3S for use in cooking utensils.

Help In Joining—B77S is a recently developed aluminum alloy for rivets in the large size range for use on heavy duty aluminum structures. Stronger than any previously available, B77S rivets can be hot driven with pneumatic hammers.

Advantages that make these new rivets practical for such structural applications as bridges and railroad cars: Average shear strength of 38,000 psi within two weeks after driving; wide temperature range for driving; good resistance to corrision in the recommended applications.

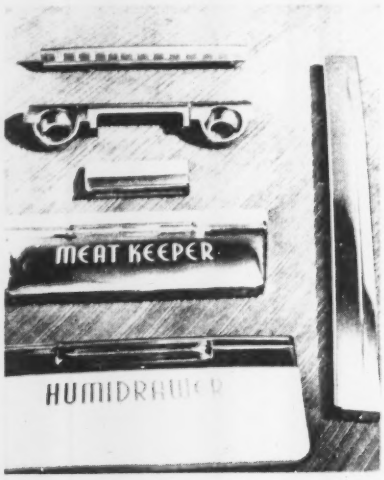
Brazed Shelves—Reynold's J51S alloy is being used for such applications as large brazed food shelves having strength requirements that cannot be met with common alloys. This alloy responds to heat treatment and is less susceptible to blistering due to incipient eutectic melting.

Alloy J51S is of the magnesium silicide type; it is produced only as sheet. Composition of the alloy: Silicon 0.20-0.50; iron 0.80 max; copper 0.15-0.40; magnesium 0.40-0.80; zinc 0.20 max; and others, 0.15 total.

Heating to temperatures necessary to braze 2S or 3S removes any hardening effect as a result of cold working. Such temperatures result in solution heat treatment of J51S alloy thereby increasing the strength. Strength of the alloy can be further increased by an artificial age treatment. Typical mechanical properties are given below:

Aluminum For Trim

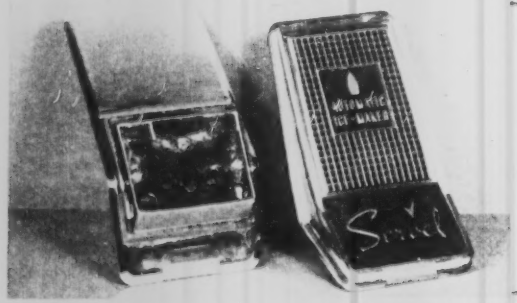
C57S Does The Job



ALUMINUM C57S alloy was developed principally for decorative applications. It gives a good account of itself in chemical or electro-brightening. Anodized finishes are unusually bright. Formability of C57S is approximately the same as 3S and 50S alloys in equivalent tempers.

Typical uses: Refrigerator trim; gift ware; appliances; reflectors; automobile trim; and door knobs. In the automotive trim field, it is moving in to compete with chromium plating and stainless steel. In addition to its high brilliance, new decorative possibilities are due to a full range of colored Alumilite finishes.

Composition of C57S alloy: Magnesium 0.8-1.2; manganese 0.15-0.45; silicon 0.12 max.; copper 0.07 max.; iron 0.17; others 0.15 max. total.



ALUMINUM GAINS GROUND FOR DIE CASTINGS

NEW ALUMINUM die casting alloy L214 is showing up well for automotive die castings and for such applications as cable accessories and various hardware items.

Reynolds Metals Co. reports that the alloy has good corrosion resistance. It can be successfully anodized. Physical properties: 10 per cent elongation with 41,000 psi ultimate strength.

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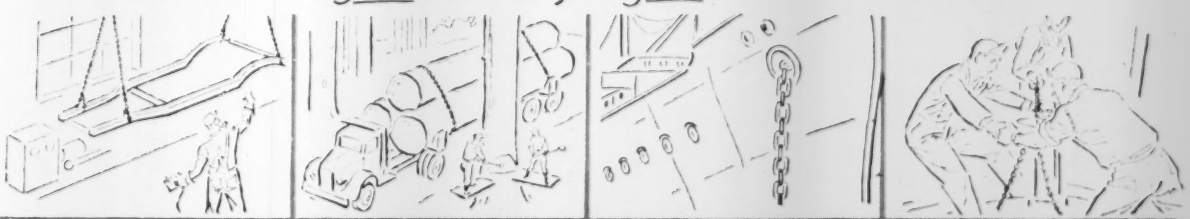

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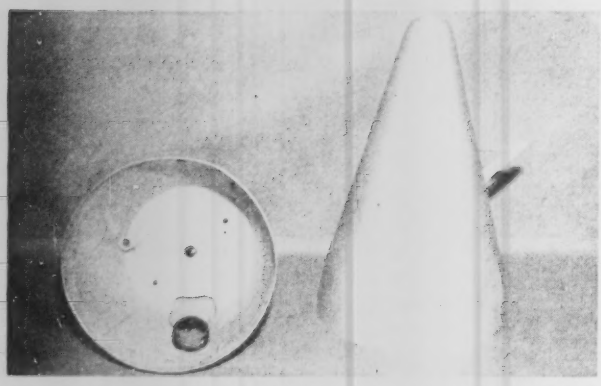
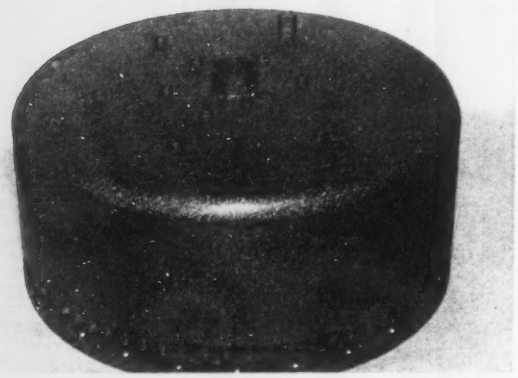


Magnesium air-intake, jet pod de-icer domes are for B-47 bomber. Corrugated sheet is used for inner shell



Pressurized containers for airborne electronic equipment are being made of magnesium by Brooks & Perkins, Inc.

Temper	Quench	Tensile	Yield	% Elongation in 2"
T4	Water	23,000	11,000	25
T4	Air	20,000	8,500	25
T6	Water	39,000	34,000	11
T6	Air	29,000	18,000	15

Electrical Aluminum — New high-strength, low-creep, high-conductivity, aluminum alloy, "Cond-Al", has been developed by General Electric for use in steam turbine generators. Aluminum base alloy contains 0.43 per cent iron, 0.32 per cent magnesium, and 0.10 per cent silicon.

Cond-Al is used in the aged condition for turbine generator field windings. Good mechanical properties of the alloy, plus its high electrical conductivity, also make it attractive for applications such as wire cable and bus bars.

More aluminum is finding its way in variety of electrical applications. Aluminum conductor wire, covered with neoprene and polyethylene, is used for secondary distribution and service drop lines.

Kaiser Aluminum "Triplex" is a self supporting cable for distribution and service drop. Two insulated conductors are cabled around a bare neutral messenger. Economies claimed: Low cost of conductor, fewer hardware items required, faster installation and improved appearance.

Help Here—New forms of aluminum are becoming available to assist the designer. One is thin-walled welded aluminum tubing produced on the new Yoder mills. At least one vacuum cleaner manufacturer is appraising it for handles on future cleaners.

Kaiser has installed a new, 5-million-pound plate stretcher for aluminum reported to be the world's largest. This has significance for users of heavy gages.

Higher Temperatures — Manufacturers using aluminum alloys at elevated temperatures are casting an eye toward products made from aluminum powder. Compressed into compacts resembling ingots it is being used experimentally to produce extrusions of three different compositions with different combinations of strength and ductility.

One of these compositions is also being used for experimental production of forgings and sheet. Strength and creep resistance above 600° F is higher than for any commercially available alloy.

Applications under consideration for these powder metallurgy products: Jet engine compressor blades and wheels, hot air valves, reciprocating engine pistons, and airplane structures adjacent to the hot areas of jet engines. Development in this country is still in the experimental stage.

Alcoa has developed an alloy for high temperature applications which is being tried out in the form of extrusions and forgings. This alloy made by conventional methods is superior to present alloys at 600° F, but is inferior to aluminum powder metallurgy products at temperatures above 600° F.

Yield Strength Up—Dow Chemical Co.'s new magnesium-thorium-zirconium alloy, HK31, provides maximum short time yield strength for intermediate to elevated temperatures and the best creep strength of any magnesium alloy at low to intermediate temperatures.

Other properties: Good corrosion resistance and weldability. A magnesium-thorium-zinc - zirconium alloy, HZ32, gives excellent creep resistance and fatigue strength at intermediate to elevated temperatures.

Alloys EK30A and EZ33A, a magnesium-rare-earth - zirconium alloy and a magnesium-rare-earth-zinc alloy respectively, provide better creep and short time yield strengths at low to intermediate temperatures than the HZ32 alloy, but are somewhat lower than the HK31 alloy. However, these alloys are a lower cost series.

Die Castings—Low cost magnesium alloy, AZ91B, is now being produced for the die castings trade. Die castings of magnesium are being used in automotive parts, power saws, levels and household appliances. Magnesium's lack of affinity for iron and the low specific gravity of the metal are conducive to automatic metal handling in die casting operations.

Dow Chemical's Madison Division will operate the first coil mill for rolling wide magnesium sheet. New modern extrusion plant will provide extrusions for a wide variety of markets. Magnesium plate up to 72-inches wide and weighing up to 1800 pounds will soon be available.

Brooks and Perkins, Inc., Detroit, is producing about 100,000 pounds of magnesium plate and sheet per month at its new Livonia rolling mill. Nominal composition

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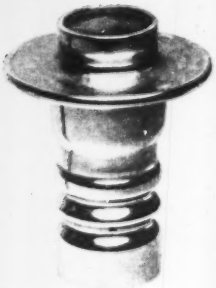

Typical example of 1-piece stamping from ⅛" thick by 7¾" diameter brass blank.

Here is a one-piece stamping that makes up into a hand stapler part.

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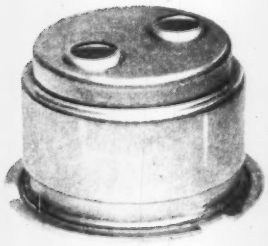
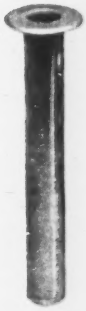
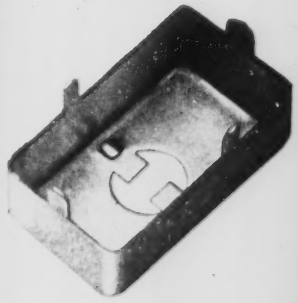


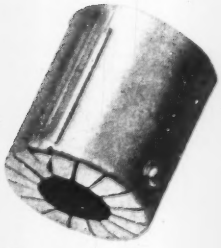
Typical intricate one-piece stamp.



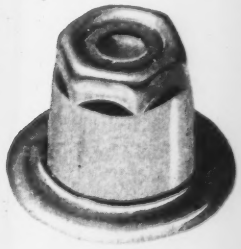
Notice the reduction in this 4⅛" long by ½" O.D. tube with 1⅛" flange.



Difficult switch part for automotive industry.



Bulb base for photo flash lap and seam produced by high-speed process.



Intricate vibration mount parts for industry.

Spring tempered phosphor bronze switch contact — note flat fold-back feature.

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SAUGUS MASSACHUSETTS

of alloy AZ31 is 3.0 per cent aluminum, 1.0 per cent zinc and balance magnesium. Typical physical properties for hot rolled plate 0.188-inch thick or more:

Ultimate tensile strength	35,000 psi
Tensile yield strength	20,000 psi
Elongation in 2-in.	16 per cent

Tread Plate — Magnesium alloy floor plate is available in the Alan Wood pattern. Weight per square foot is slightly greater than for corresponding flat magnesium sheet and plate because thickness is measured on the base plate between raised patterns. This product is available in alloy AZ31.

Titanium — Titanium is a most important new metal. It combines high strength and light weight with good resistance to both heat and corrosion. Today, only limited quantities of titanium are available for other than priority military applications. Sponge production and mill facilities are expanding rapidly; within a year over-all production will increase appreciably.

Titanium is 40 per cent lighter than stainless steel but just as strong. It retains useful strength at temperatures up to 800-1000 F. That is the reason it is being used for an expanding list of priority aircraft and ordnance applications: Turbine discs, compressor blades, and other forgings for jet engines; fire walls, bulkheads, shrouds, cowling, ducting bolts, and structural members of airplanes.

Titanium will resist a 2000 F flame so well that it has been approved for firewalls in aircraft.

Corrosion Resistance—Titanium is the only structural metal which is completely unattacked by sea water or marine atmospheres. It is also impervious to many chemicals, such as concentrated nitric acid and strong alkalies. Its use in condensers, evaporators, autoclaves, tubing, valves, fittings, and similar equipment can prevent costly replacements and down time.

Titanium is not corroded by most nitric acid solutions, wet chlorine and chlorine water, mixed sulphuric and nitric acids, ferrous chloride, cuprous chloride and most alkali salts. It is not recommended for service in mineral acids unless oxidizing agents are present, nor in formic acid or dry chlorine.

Mechanical Properties—Annealed Titanium and Titanium Alloys

(Compositions and properties given are nominal unless otherwise indicated)

Material	Producer	Composition	Tensile Strength Psi	Yield Strength Psi	Elong. In 2-In. %	Hardness
RS-40	Republic Steel Corp.	99+% Ti, 0.20 C Max	50,000 (Min)	40,000 (Min)	20 (Min)	Rb 85-Nom
RS-55	Republic Steel Corp.	99+% Ti, 0.20 C Max	85,000 (Min)	55,000 (Min)	20 (Min)	Rb 90
RC-55	Rem-Cru Titanium, Inc.	99+% Ti, 0.20 C	75,000	65,000	25	RA 52-56
Ti-75A	Titanium Metals Corp.	99+% Ti, 0.20 Fe, 0.10 N, Trace O	90,000	80,000	25	Rb 93-95
RS-70	Republic Steel Corp.	99+% Ti, 0.20 C	80,000 (Min)	70,000 (Min)	25	Rb 95
MST Grade III Arc Melted	Mallory-Sharon Titanium Corp.	99+% Ti, 0.1 C Max	80,000	65,000	25	RA 59
RC-70	Rem-Cru Titanium, Inc.	99+% Ti, 0.20 C	90,000	80,000	18	Rc 30
Ti-100A	Titanium Metals Corp.	99+% Ti, 0.07 C Max, 0.30 Fe	110,000	100,000	15	.....
RS-70A	Republic Steel Corp.	99+% Ti, 0.20 C Max, 1.00 Mn Max	80,000 (Min)	70,000 (Min)	15 (Min)	Rb 95
RS-110	Republic Steel Corp.	98+% Ti, 7.0 Mn	120,000 (Min)	110,000 (Min)	12 (Min)	RC 30
RS-120	Republic Steel Corp.	91+% Ti, 7.0 Mn	130,000 (Min)	120,000 (Min)	10 (Min)	RC 32
RC-130A	Rem-Cru Titanium, Inc.	91+% Ti, 8.0 Mn	130,000	115,000	15	.....
Ti-130A	Titanium Metals Corp.	92+% Ti, 2.0 Fe, 2.0 Cr, 2.0 Mo, 0.07 C, 0.30 N, 0.20 O	140,000	125,000	12	300-340 Bhn
Ti-150A	Titanium Metals Corp.	85+% Ti, 0.07 C, 1.5 Fe, 0.10 N, 0.25 O, 2.7 Cr	150,000	130,000	20	.....
RC-130B	Rem-Cru Titanium, Inc.	91+% Ti, 4.0 Mn, 4.0 Al	140,000	125,000	15	311-364 Bhn
MST Grade 2.5-5 Fe-2.5% V (Exp.)	Mallory-Sharon Titanium Corp.	94+% Ti, 2.5 Fe, 2.5 V	140,000	130,000	12	RA 65
MST Grade 2.5 Al-2% Fe (Exp.)	Mallory-Sharon Titanium Corp.	95+% Ti, 2.0 Al, 2.0 Fe	145,000	135,000	12	RA 66
MST Grade 3% Al-5% Cr Forging Alloy (Furnace cooled)	Mallory-Sharon Titanium Corp.	91+% Ti, 3.0 Al, 5.0 Cr	150,000	140,000	14	RA 68
MST Grade 4% Mn	Mallory-Sharon Titanium Corp.	92+% Ti, 4% Mn	130,000	115,000	15	.....

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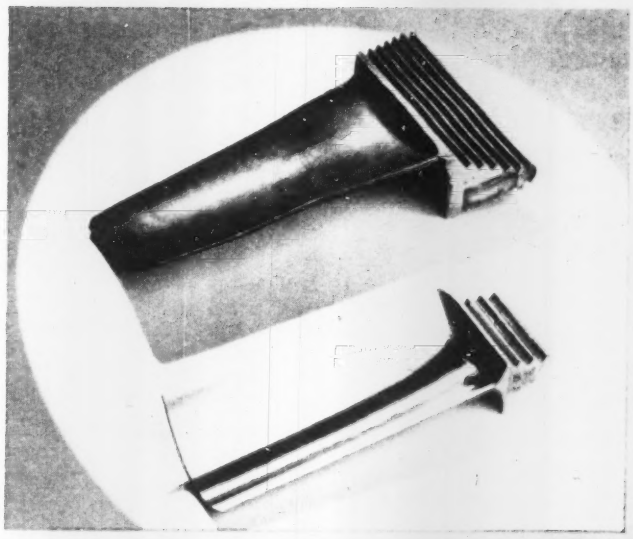


Aircraft turbine blades forged from vacuum-cast high temperature alloy. Top: after extended service; Bottom: Prior to use

Heat and Corrosion Resistant Materials

Careful selection can take advantage of the best materials for extreme service conditions

FOR virtually all materials, higher temperature resistance is becoming a paramount goal. Along with higher temperatures, materials must also withstand higher operating pressures and more severe service stresses. Requirements for corrosion resistance must also be counted in.

There is in progress a concentrated effort to develop materials capable of standing highly stressed operating conditions at temperatures above 1800° F. High temperature requirements of jet engines, gas turbines, long range rockets, guided missiles and atomic power plants have led metallurgists to face the fact that improvements in conventional metal systems may not solve the many new problems that have arisen.

For these super high temperature requirements, research is headed in two directions: 1. New refractory alloy systems and 2. Metal bonded refractory compounds, called cermets.

High Melting Point—Refractory metals, so called because their melting points are above 3000° F, include a group of elements which were formerly used mainly as steel alloying elements. Of this group, molybdenum and its alloys seem to have the inside track for applications involving super high temperature service.

Alloys have already been developed which show good stress rupture properties at 1900° F. There's promise of alloys for use at even higher temperatures.

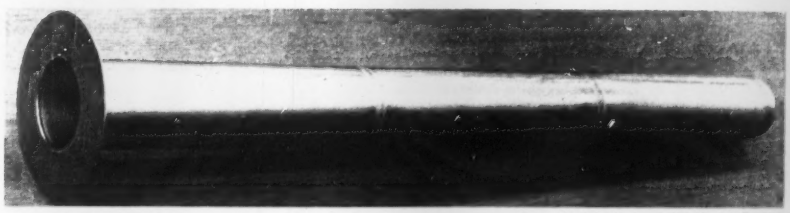
In the temperature range 1600 to 2000° F, even pure molybdenum shows better load carrying ability than the best cobalt, nickel, or chromium-nickel-iron base alloys. One big hurdle remains to be overcome before molybdenum can be used for high temperature service: It scales rapidly in oxygen containing atmospheres at high temperatures. So far, no alloy has shown any significant improvement in oxidation resistance.

Progress—One method of protection uses cladding with a metal or alloy of better oxidation resistance than molybdenum. Nickel, 18-8 stainless and Inconel have been tried.

Looking Up Too—Chromium is another metal with a higher melting point than iron, cobalt or nickel. Chromium base alloys are being examined from several angles; some feel that they may be the next step up on the temperature scale.

Several million pounds of high purity chromium will be available yearly when production starts this fall at new facilities being constructed by Electrometallurgical Co., Marietta, O. For the first time, high-purity, electrolytic chromium will be available commercially.

Alternate for 16-25-6 Alloy—Among the most widely used of the superalloys is Timken's 16-25-6 alloy. Principal applications: turbine wheels for turbosuperchargers and jet engines. Since it was introduced some 10 years ago, more



Fansteel Metallurgical Corp.

Molybdenum tube for high temperature service. Inert arc gas welding process was used in fabrication

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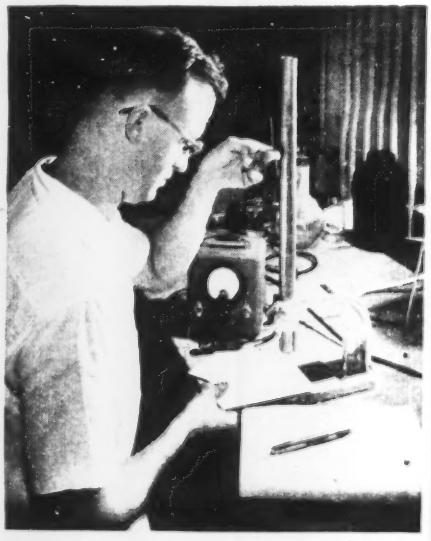

At Pennsalt's famous Whitemarsh Research Laboratories, where Fosbond was developed, there are unusually fine testing facilities at the disposal of manufacturers using the Process.

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Now Pennsalt, long a pioneer in the metal processing field, offers everything you need for uniform, trouble-free phosphating of steel and zinc!

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Every product and technique now offered has been fully field-tested for two years or more. Experienced Pennsalt specialists are ready to come into your plant to show you how to get the most from this advanced system. Furthermore, once the cycle has been introduced in your plant, these men will continue to help you maintain a trouble-free system.

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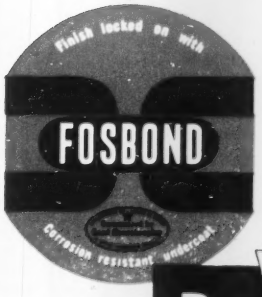
How's this for proof?

To prove what we say about the Fosbond Process, we offer this service: tell us (1) type of metal to be coated, (2) kind of phosphate coating now used, (3) method of application to be used, (4) kind of organic finish to be employed, and (5) conditions which finish must meet. In turn, we will supply either panels coated by means of the Fosbond Process, or Fosbond chemicals for your use in preparing panels. Then, subject these panels to whatever tests you wish . . . and *you* be the judge.

Which of your products and operations can benefit from the Fosbond Process? Give us details on these items; we'll be able to answer your questions more specifically. Write to Metal Processing Department, 424 Widener Building, Philadelphia 7, Pa.



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Wrought High Temperature Alloys

	Composition (per cent)											Maximum Service Temp
	C	Cr	Ni	Co	Mo	W	Cb	Ti	Others	Fe	Uses	
S-816	0.37	20	20	42	4.0	4.0	4.0			5.0 max	Jet blades	1500° F
S-590	0.43	20	20	20	4.0	4.0	4.0			Bal	Turbine blades	1400° F
V-36	0.30	25	20	42	4.0	2.0	2.0			5.0 max	Hi temp sheet	1800° F
A-286	0.05	15	25.5		1.3			2.0	0.35 AL max 0.30 V	Bal	Turbine wheels, buckets; bolts & jet hardware	1300° F
M-252[1]	0.15	20	53	10	10			2.5	0.90 AL	5.0 max	Jet blades	1500° F
Waspaloy[2]	0.08	20	58	14	3.5			2.5	1.25 AL	2.0 max	Jet blades	1500° F
Discaloy	0.05	13.5	26		3.0			1.7	0.35 AL max	Bal	Turbine wheels, bolts & jet hardware	1300° F
N-155	0.15	21	20	20	3.0	2	1		0.15 N	Bal	Hi temp sheet	1400° F
16-25-6	0.10	16	25		6				0.15 N	Hal	Turbine wheels & rims	1250° F
									0.15 N	Bal		
19-9 DL	0.30	19	9		1.4	1.4	0.45	0.25		Bal	Hi temp sheet	1250° F

[1] A GE alloy produced only for their use
[2] Pratt & Whitney alloy produced only for their use

Allegheny Ludlum Steel Corp

than 35 million pounds of 16-25-6 billet stock have been shipped by Timken.

Short time ago Timken researchers launched a program to develop a material with lower alloy content without sacrificing the desirable properties of the 16-25-6 alloy.

The 16-15-6 Alloy—Reviewing the basis which led to the development of the 16-15-6 alloy, it looked as if a chromium content of about 16 per cent was needed to keep the necessary oxidation and corrosion resistance. Addition of 6 per cent molybdenum offered the best approach for desired high temperature strength. Low carbon was needed to insure good forging and welding characteristics. And to be fully austenitic, alloy required 25 per cent nickel to balance the chromium and molybdenum.

Nickel was the key. Most logical substitute was manganese.

By reducing the nickel content of 16-25-6, it was possible to increase the amount of nitrogen that could be introduced into the alloy; high nickel reduces the solubility of nitrogen in steel, while manganese enhances it. Nitrogen has a beneficial effect on creep strength and is a stabilizer for austenite during primary crystallization.

Here It Is—Chemical specification for the new high temperature 16-15-6 alloy is: Carbon, 0.08 per cent max; manganese, 2.0 max; silicon, 1.0 max; chromium, 15.0-17.5; nickel, 14.0-17.0; molybdenum, 5.5-7.0; nitrogen, 0.15-0.25.

Compared with the previous 16-25-6 alloy, manganese, silicon, chromium, molybdenum are the same; also, for 16-25-6, nickel is in range 24.0-27.0; carbon is higher at 0.12 max, and nitrogen is lower, the range being 0.10-0.20.

New 16-15-6 alloy is fully austenitic; its microstructure and room temperature physical properties compare closely to those of the standard 16-25-6 alloy. At elevated temperatures, the excellent ductility values to fracture are a distinguishing mark of the new alloy.

Bonus—High ductility values at elevated temperatures indicate that the 16-15-6 alloy is notch-ductile. This was confirmed not only on bar stock but also on an actual turbine wheel rim forging from which notch-rupture tests were obtained.

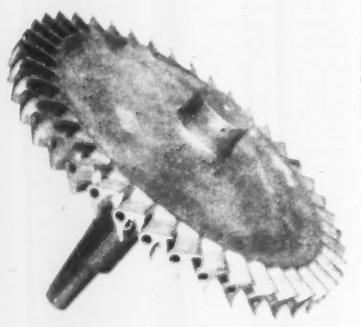
Heat Treated—Certain high-temperature, wrought alloys are heat treated to achieve optimum properties. Generally these are chromium-nickel-iron alloys, or in some cases, cobalt-base alloys. For strengthening they have additions of tungsten, columbium, molybdenum, titanium and aluminum. Precipitated phases of carbides or intermetallic compounds resulting from heat treatment are important in giving the needed properties.

Cast, cobalt-base alloys are another type of high-temperature materials used for nozzle guide vanes and rotating blades in jet engines. Typical: Haynes Stellite 21 and 31 alloys.

Nickel-base alloys are making progress high temperature-wise. Two improvements are Waspaloy developed by Pratt and Whitney and M-252 by General Electric. These nickel base alloys have cobalt additions of 10 to 15 per cent, molybdenum of 3.5 to 10 per cent and strengthening amounts of titanium and aluminum.

Zirconium—Main reason for industrial interest in zirconium is its extreme resistance to corrosion. Even hot, 20-per-cent hydrochloric acid does not attack it appreciably; it can be used as an acceptable substitute for expensive tantalum. Its resistance to strong alkalies is superior to tantalum.

Zirconium ingots can be forged or rolled in air like other metals without serious scaling. In the form of hot rolled bars, metal has a tensile strength of 97,000 to 113,000 psi with an elongation of 9 to 14 per cent. Zirconium tubing, both seamless and welded is expected to be available shortly.



Kentanium impulse turbine wheel for operation at 2000 to 2200° F

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Heat and Corrosion Resistant Alloys of Hastelloy Type

Nominal Composition, Per cent	Available Forms	Special Properties	Corrosion Resistance
Hastelloy B Cr—1 max C—0.12 max Mo—26.30 Si—1 max Mn—1 max Fe—4.7 Ni—balance	Conventional and precision investment castings; hot-rolled sheet, plate and bar stock; drawn wire; drawn and welded tubing; welding rod; coated electrodes; pipe and pipe fittings.	Strong at high temperatures. Can be softened by heating to a high temperature and quenching in water or cooling in air. Cold-working materially hardens the alloy, raises its yield point and ultimate strength.	Particularly well suited for equipment handling boiling hydrochloric acid and wet hydrogen chloride gas. Resists sulphuric acid, and has good resistance to phosphoric acid.
Hastelloy C Cr—15.5-17.5 C—0.15 max Mo—16.18 Si—1 max Mn—1 max Fe—4.5-7.0 W—3.75-5.25 Ni—balance	Conventional and precison investment castings; hot-rolled sheet, plate and bar stock; drawn wire; drawn and welded tubing; welding rod; coated electrodes; pipe and pipe fittings.	Very strong at high temperatures. Resists oxidizing or reducing atmospheres up to 2100 deg. F. Resists thermal shock resulting from repeated quenching from temperatures of 1600 to 1800 deg. F.	Most universally corrosion-resistant alloy available today. Withstands strong oxidizing agents. Also highly resistant to sulphuric, phosphoric, acetic, formic, and sulphurous acids.
Hastelloy D Cr—1 max C—0.12 max Si—8.5-10.0 Mn—0.80-1.25 Fe—1 max Cu—2.0-4.0 Ni—balance	Conventional castings; cast welding rod; pipe and pipe fittings.	Used extensively to resist wear, abrasion and galling where corrosion may or may not be a problem. A slight modification in analysis, with improved toughness, is available.	Exceptionally resistant to sulphuric acid of all concentrations, even up to the boiling point. Fair resistance to hydrochloric acid at moderate temperatures.
Hastelloy F Cr—21 to 23 C—0.08 max Ni—44 to 47 Mo—5.5 to 7.5 Cb + Ta—1.75 to 2.5 Ta—0.50 min Co—2.50 max Fe—balance	Sheet, plate, bar stock, drawn wire, drawn and welded tubing.	Has good high temperature properties. Is stronger and about as tough as austenitic stainless steels. Ductile enough for intricate cold-forming operations. Can be welded by metal-arc, inert gas shielded arc and resistance welding methods.	Withstands the corrosive effects of oxidizing and reducing acids. Handles both acid and alkaline solutions. Good resistance to sea water.
Hastelloy X Cr—22 C—0.15 max Ni—45 Mo—9.0 Fe—balance	Sheet, plate, bar stock, wire and precision investment castings.	Has good creep-rupture properties. Excellent forming characteristics. High resistance to oxidation.	Excellent resistance to oxidation in furnace atmospheres at temperatures up to 2200 deg. F.
Haynes No. 25 Cr—19.0-21.0 C—0.15 max Ni—9.0-11.0 W—14.0-16.0 Si—1.0 max Mn—1.0-2.0 Fe—3.0 max Co—balance	Hot-rolled sheet, plate, and bar stock; drawn wire; drawn and welded tubing; welding rod; coated electrodes.	Exceptional mechanical properties at temperatures up to 1800 deg. F. in the fully annealed condition without subsequent aging. Easy to fabricate. Ideal for highly stressed parts that must operate at elevated temperatures.	Resists corrosion caused by oxidation and exhaust fuel gases at elevated temperatures.
Multimet Cr—20.0-22.5 C—0.20 max Ni—19.0-21.0 Mo—2.5-3.5 Cb + Ta—0.75-1.25 W—2.0-3.0 Co—18.5-21.0 Fe—balance	Conventional and precision investment castings; hot-rolled sheet, plate and bar stock; drawn wire; drawn and welded tubing; welding rod; coated electrodes.	Has inherently satisfactory high-temperature properties without age-hardening treatments. Expansion characteristics are similar to those of 18-8 steels. Resists oxidation at temperatures as high as 2000 deg. F.	Resists corrosion caused by oxidation at temperatures as high as 2000 deg. F. and also withstands action of exhaust fuel gases.

Metal-Ceramic—Kentanium is a cermet having titanium carbide as its chief ingredient with nickel or other metals as the primary bonding metal. Some compositions contain a small percentage of columbium carbide which improves resistance to oxidation. Where this property is required columbium carbide is added.

Amount of bonding metal used influences thermal conductivity, tendency toward plastic flow and strength. Lower its content, lower the tendency for plastic flow at any given temperature; at the same time, thermal conductivity and strength are reduced so that resistance to thermal and mechanical shock is lowered.

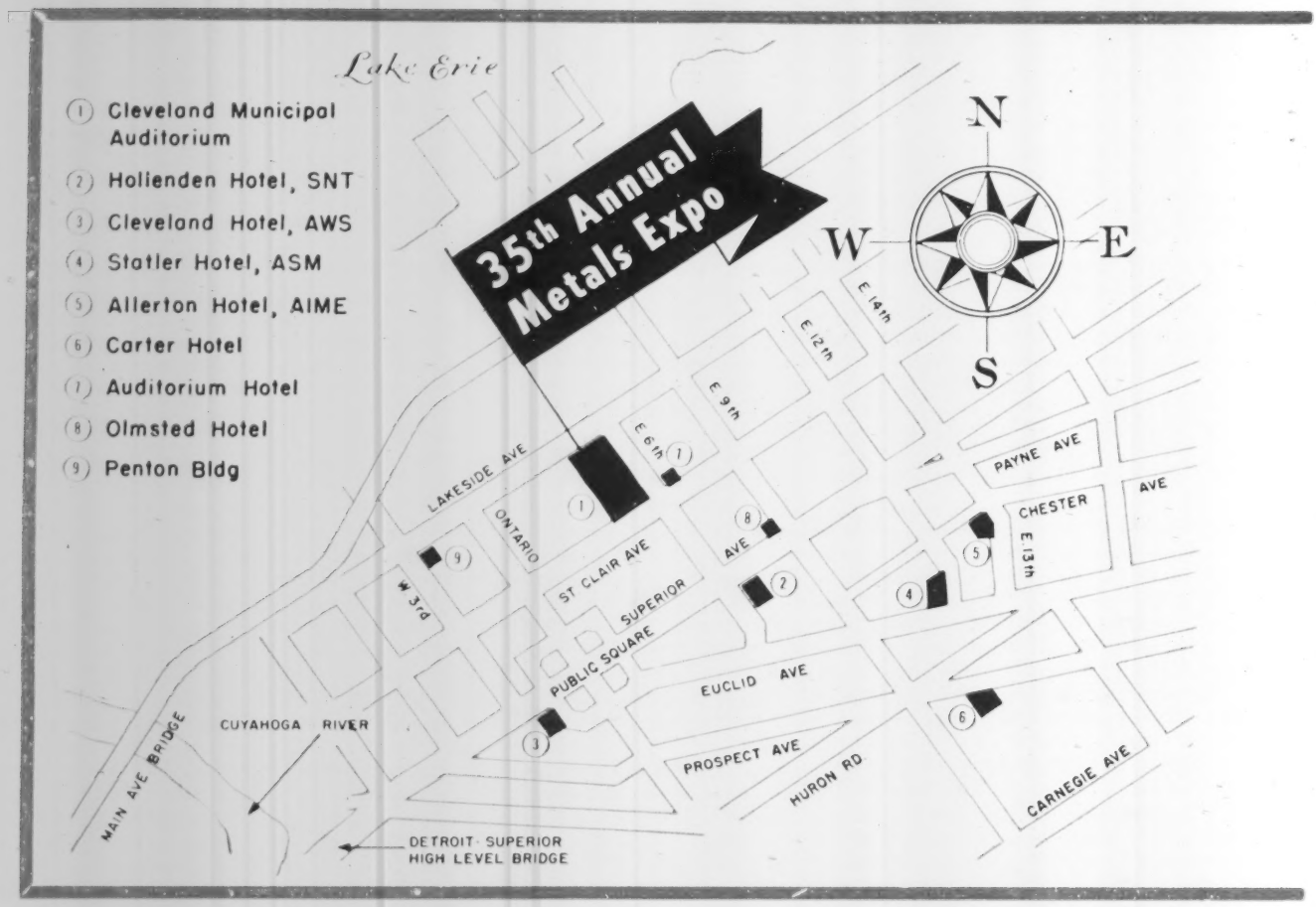
Intensive tests are being made with Kentanium for such parts as: Turbine blades and buckets; exhaust valves for reciprocating engines; wastegate valve shafts; turbine nozzle vanes; and afterburner segments which present a severe test at 2000 to 2500° F.

Same combination of properties that make cermets attractive for high temperature and gas turbine use suggests other industrial uses: Thermocouple protection tubes; high temperature and pressure research vessels; hot extrusion die inserts; sealing rings for engines; bearings in atomic equipment; and reciprocating engine exhaust valves.

Chrome Carbide—A new member of the group of cemented carbide materials, chromium carbide, was recently announced by Carboloy. The metal referred to as grade 608 is already making its mark in some quarters. Here's why: Good corrosion and high temperature resistance, abrasion and erosion resistance, relatively light weight and nonmagnetic qualities.

Uses for this cemented carbide are envisioned for such items as valve trim, nozzles, pump seal rings, orifices for hot gases. Today, bearings for specialized applications are being tested where resistance to corrosion and wear is necessary and where nonmagnetic materials are needed, such as in electronic and magnetic equipment.

Vanadium Carbide—In the cutting tool field, Firth Sterling has developed a tool steel based on vanadium carbide embedded in a tough low alloy matrix. Hardness is equivalent to Rockwell C 84. New tool, known as Firth VC, is credited with high shock resistance, toughness, cutting ability.



SHORT CUTS FOR SHOW

TRANSPORTATION'S EASY

Rail and air travel to Cleveland is excellent.

Seven major roads run passenger service from all sections of the country. They're the Pennsylvania, New York Central, Erie, Baltimore & Ohio, Chesapeake & Ohio, Nickel Plate and the Big Four.

If flying is more convenient, try American, United, Capital, Eastern, Lake Central, Northwest, Trans-Canada and TWA. They all run convenient, frequent flights into Hopkins Municipal Airport.

Executive and private planes can land at Cleveland's lakefront airport which is within sight of the exposition hall.

NOT TOO MANY years ago, Metal Shows were concerned mainly with heat treating, steels and a sprinkling of the lighter metals. The pace was friendly and liesurely with exhibitors greeting booth visitors by their first names. Those days are gone forever!

Keeping in step with the amazing expansion of the metals industry has brought about a 35-year string of Metals Shows, each bigger than the one before it. Not to be outdone, the 1953 show brings together some 450 exhibitors and an estimated 70,000 people.

What It Means—If you're the average show-goer, the thought of more exhibits, more technical sessions and more people than attended last year's extravaganza in Philadelphia is a little bit staggering. You might be interested to know that it leaves the show's sponsor, American Society for Metals, somewhat aghast too.

Their lusty child has gradually outgrown just about every existing exhibition space in the country. Only three are big enough—Cleveland, Chicago and Philadelphia—and these cities will have to take turns playing host until any larger accommodations are built. But that's their problem; yours is to get the most out of the show.

Some Tips — Mindful of the enormity of the layout and the diversity of interesting technical papers and exhibits, show sponsors offer the following suggestions:

1. Register in advance or as soon as you arrive in Cleveland. It's a painless task, but a time-waster if you have to wait in line.

REGISTRATION & PROGRAMS

If you haven't registered in advance, desks will be provided for that purpose at two points of entry to the auditorium. There will be a large battery of machines typing out badges so the chore should be painless.

Official programs are available at the registration desks for all show-goers. They'll be complete in every detail of meetings and exhibits.

EXPOSITION HOURS

For the first three days of the show, exhibition halls will open at 12 noon and continue until 10:30 pm. On Thursday and Friday, hours will be 10 am to 6 pm.

Oct. 19 Monday	noon to 10:30 pm
Oct. 20 Tuesday	noon to 10:30 pm
Oct. 21 Wednesday	noon to 10:30 pm
Oct. 22 Thursday	10 am to 6 pm
Oct. 23 Friday	10 am to 6 pm

GOERS

2. On your program, check off the technical papers you intend to hear and the exhibits of prime interest. Locate the latter on the expo floor plan and trace a projected travel route. Sounds unnecessary, but you'll save a lot of mileage in the bunion derby.
3. Stick to the original plan of attack. This is tougher than it sounds; there'll be a lot of appealing exhibits vying for your time. Check them off and come back later.
4. Budget a day for "just browsing" through the exhibit halls. You'll be amazed at the number of ideas you can pick up in fields that may be on the fringe of your activities.
5. Get all the facts. Biggest complaint among booth attendants every year is that too many visitors ask too few questions. Exhibitors are primed with all the answers, so blast away.

Society Headquarters—Each of the four participating societies has its headquarters in a separate downtown hotel. American Society for Metals takes over the Hotel Statler at E. 12th and Euclid Ave.; American Welding Society is housed at Hotel Cleveland on the Public Square; American Institute of Mining and Metallurgical Engineers, Metals Division, convenes at the Allerton Hotel, E. 13th and Chester Ave.; and Society for Nondestructive Testing holds forth at the Hollenden Hotel, E. 6th and Superior Ave.

Unless otherwise announced, all technical sessions of the respective societies will be held in meeting rooms at the headquarters hotel. All four hotels are within walking distance or a short cab hop of Public Auditorium.

Head Start — To give STEEL's readers plenty of time to plan their activities in advance, succeeding pages carry the full technical program for the week, floor plans of all exhibit space with booths identified, and an alphabetical list of exhibitors and what they're showing.

Only thing left unsaid is: SEE YOU AT THE SHOW!

EATING AND ENTERTAINMENT

Being a convention city, Cleveland has many fine restaurants and taverns to choose from. Most of the medium-priced spots are located on or near Euclid Ave., as are the first-run theatres, department stores and better shops. Specialty restaurants, usually a bit more expensive, are located off the beaten paths; some are even located in the suburbs to the east and west. Night life, for the most part, centers around the hotels and downtown clubs, most of which are off the main streets.

All hotels carry copies of weekly pamphlets telling what's going on in Cleveland. If your entertainment questions aren't answered there, the Public Relations office in the exhibition hall will be staffed with people who know Cleveland by day and night.

CLEVELAND—METALWORKING HUB

Advertised as the "Best Location in the Nation", Cleveland is at the center of a 500-mile radius which contains 57.5 per cent of the nation's population.

Nearly 300,000 people work in Cleveland's 3258 manufacturing establishments. Although the metropolitan area accounts for only 0.9 per cent of the U.S. population, it produces 2.06 per cent of the country's manufactured goods.

Here's how production breaks down on a per cent-of-U.S.-total basis:

Blast furnace output	4%	Stampings	4-1/3
Finished steel	3	Metal fasteners	17½
Rolled strip	8	Machine tools	9
Wire drawing	7-8	(Turret lathes	50)
Malleable iron castings	9	Drive components	11
Forgings	7¾	Conveyors	7-2/3
Gray iron castings	5½		

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The modern Udylite Laboratory at Detroit, Michigan

A set of rusty piano wires is responsible for the fast, economical modern Cadmium Process you use today.

In 1919, young Marvin Udy became intrigued by a problem that had never been solved—how to rustproof piano wire without changing the tone. He knew that lead, copper and nickel had been tried without success.

After many experiments, Udy tried a little-known waste metal called Cadmium which he had recovered from flues of a western smelting company. After many failures, he finally succeeded in coating piano wire with the then unknown metal!

His new Cadmium Process worked . . . and an industry was born.

The infant Udylite Company, starting in a stockholder's basement, improved methods and techniques in applying the Cadmium. Through the years, the Udylite Corporation has continued to pioneer Cadmium. It developed the Ball Anode, Ball Anode Containers, the Brighteners . . . and has led every step of the way to the better rust prevention offered today in the newest Udylite Bry-Cad Process.

Udylite has shared these technical improvements with you and the entire industry . . . just as it has shared every improvement in Plating Equipment and Processes through the years.

This Udylite Cadmium Process is just *one* of *many* ways Udylite has pioneered in the electroplating field.

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J. B. AUSTIN
President, American Society for Metals, 1953-54

PROGRAM

35th National Metal Congress and Exposition

CLEVELAND, OHIO—OCTOBER 17-23, 1953

ASM SEMINAR ON

Relation of Properties to Microstructures

All Sessions in Ballroom, Hotel Statler

Morning Session, Oct. 17, 1953

9:30 a.m.—Structure and Structure-Sensitive Properties—J. H. Hollomon, manager, metallurgy research department, General Electric Laboratory, Schenectady, N. Y.

10:10 a.m.—Discussion

10:20 a.m.—Effect of Grain Boundaries on Mechanical Properties—M. Gensamer, professor of metallurgical engineering, School of Mines, Columbia University, New York.

11:00 a.m.—Discussion

11:10 a.m.—Intermission

11:20 a.m.—Principles of Solution Hardening—E. R. Parker, professor of metallurgy, University of California, Berkeley, Calif. and T. Hazlett, University of California.

12 Noon—Discussion

Afternoon Session, Oct. 17, 1953

2:00 p.m.—Effect of Dispersion on Mechanical Properties—J. E. Dorn, professor, physical metallurgy and C. D. Starr, University of California, Berkeley, Calif.

2:40 p.m.—Discussion

2:50 p.m.—Theory of Dispersion Hardening—E. W. Hart, research associate, General Electric Research Laboratory, Schenectady, N. Y.

3:30 p.m.—Discussion

3:40 p.m.—Intermission

3:50 p.m.—Structure and Alloy Design—A. D. Schwope, research supervisor, metallurgical engineering, Battelle Memorial Institute, Columbus, O.

4:30 p.m.—Discussion

Evening Lecture, Oct. 17, 1953

8:00 p.m.—Interaction of Dislocations with Solute Atoms—A. H. Cottrell, professor of physical metallurgy, The University, Birmingham, Eng.

9:00 p.m.—Discussion

Morning Session, Oct. 18, 1953

9:30 a.m.—Relation of Fracture to Microstructure—J. R. Low, research associate, General Electric Research Laboratory, Schenectady, N. Y.

10:10 a.m.—Discussion

10:20 a.m.—Strength of Glass Reinforced Structures—G. Slayter, vice president, research and development, Owens-Corning Fiberglas Corp., Newark, O.

11:00 a.m.—Discussion

11:10 a.m.—Intermission

11:20 a.m.—Relation of Corrosion to Microstructure—H. H. Uhlig, professor of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

12 Noon—Discussion

Afternoon Session, Oct. 18, 1953

2:00 p.m.—Theory of the Relation of Magnetic Properties to Microstructure—L. J. Dijkstra, research laboratories, Westinghouse Electric Corp., Pittsburgh, Pa.

2:40 p.m.—Discussion

2:50 p.m.—Structure and Coercivity—J. Libsch, associate professor of metallurgy, Lehigh University, Bethlehem, Pa. and G. Conrad, assistant director of magnetic materials laboratory, Lehigh University, Bethlehem, Pa.

3:30 p.m.—Discussion

Educational Lectures

All Sessions in Ballroom—Public Auditorium

Monday, Oct. 19, 4:30 p.m.

Surface Protection Against Wear

Technique Selection—Howard S. Avery, research metallurgist, American Brake Shoe Co., Mahwah, N. J.

Electroplates and Anodizing—J. M. Hosdowich, United Chromium Inc., New York.

Case Hardening, Diffusion Coatings and Selective Heat Treatment—Michael B. Bever, department of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

Metal Spraying—Howard Vanderpool, sales engineering manager, Metallizing Engineering Co. Inc., New York.

Monday, Oct. 19, 8 p.m.

Surface Protection Against Wear

Hard Facing and Abrasion-Resistant Alloys—Howard S. Avery, research metallurgist, American Brake Shoe Co., Mahwah, N. J.

Practical Examples of Surface Protection—Theodore Gaynor, superintendent of inside shops, Bethlehem Steel Co., Bethlehem, Pa.

Summary and Discussion—Howard S. Avery

Tuesday, Oct. 20, 4:30 p.m.

Surface Protection Against Corrosion

Economic Factors of Atmospheric Corrosion versus Protection—Clarence C. Harvey, Ethyl Corp., Baton Rouge, La.

Surface Preparation and Pretreatment of Metals Prior to Painting—A. J. Liebman, assistant director, research & development department, Dravo Corp., Neville Island, Pittsburgh

Organic Coatings for Normal Service—Arnold J. Eickhoff, National Lead Co., Brooklyn, N. Y.

Organic Coatings for Severe Service—Kenneth Tator, Kenneth Tator Associates, Coraopolis, Pa.

Tuesday, Oct. 20, 8 p.m.

Surface Protection Against Corrosion

Specifications for the Painting of Metals—Joseph Bigos, director of research, Steel Structures Painting Council, Pittsburgh.

Cathodic Protection and Galvanizing—H. A. Robinson, chief, chemical section, Dow Chemical Co., Midland, Mich.

Metallizing—H. S. Ingham, Metallizing Engineering Co. Inc., Long Island City, N. Y.

Electrodeposited Coatings—Field Ogburn, chemist, National Bureau of Standards, Washington.

Wednesday, Oct. 21, 4:30 p.m.

Fatigue

Basic Concepts of Fatigue Damage in Metals—T. J. Dolan, research professor of theoretical & applied mechanics, University of Illinois, Urbana, Ill.

Fatigue Failure Under Resonant Vibration Conditions—B. J. Lazan, director of engineering experiment station, University of Minnesota, Minneapolis.

Wednesday, Oct. 21, 8 p.m.

Fatigue

Fatigue Characteristics of Large Sections—O. J. Horger, chief engineer, railway division, Timken Roller Bearing Co., Canton, O.

Technical Papers

Monday, Oct. 19—9:30 a.m.

Ballroom, Hotel Statler

Titanium and Molybdenum

Determination of Oxygen in Titanium and Zirconium by the Isotopic Method—A. D. Kirshenbaum, R. A. Mossman and A. V. Grosse, research institute, Temple University, Philadelphia.

Vacuum-Fusion Analysis of Molybdenum—M. W. Mallett, assistant supervisor, thermal chemistry group, and C. B. Griffith, Battelle Memorial Institute, Columbus, O.

Nitriding of Titanium with Ammonia—J. L. Wyatt, assistant to technical manager, Horizons Inc., Cleveland, and N. J. Grant, associate professor of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

Heat Treatment of High-Strength, Titanium-Base Alloys—W. M. Parris, engineer, P. D. Frost, assistant supervisor, and J. H. Jackson, supervisor, Battelle Memorial Institute, Columbus, O.

Monday, Oct. 19—2 p.m.

Ballroom, Public Auditorium

Titanium

Transformation Kinetics and Mechanical Properties of Titanium-Aluminum-Molybdenum Alloys—H. D. Kessler, supervisor, nonferrous metals research, and M. Hansen, chairman, metals research, Armour Research Foundation, Chicago.

Isothermal Transformation of Titanium-Manganese Alloys—P. D. Frost, assistant supervisor, W. M. Parris and L. L. Hirsch, research engineers, nonferrous metallurgy; J. R. Doig, research engineer and C. M. Schwartz, supervisor, physics division, Battelle Memorial Institute, Columbus, O.

Correlation Between Heat Treatment, Microstructure and Mechanical Properties of Titanium-Molybdenum Alloys—D. J. DeLazaro, assistant metallurgist, and W. Bostoker, senior metallurgist, metals research department, Armour Research Foundation, Chicago.

Tuesday, Oct. 20—9:30 a.m.

Ballroom, Hotel Statler

Mechanical

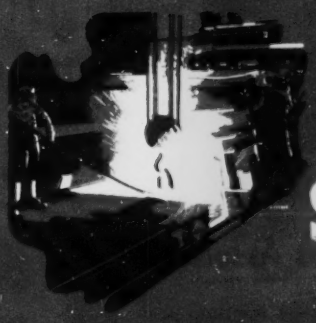
Transverse Mechanical Properties of Slack-Quenched and Tempered Wrought Steel—John Vajda and Paul E. Busby, Carnegie Institute of Technology, Pittsburgh.

A Time-Temperature Relationship for Recrystallization and Grain Growth—F. R. Larson and J. Salmas, physical metallurgists, Watertown Arsenal Laboratory, Watertown, Mass.

Effect of Nonmartensite Decomposition Products on Properties of Quenched and Tempered Steels—E. F. Bailey, metallurgist, Naval Research Laboratory, Washington.

Effect of Inclusions on Fatigue Strength of SAE-4340 Steels—J. T. Ransom, research project engineer, E. I. duPont deNemours & Co., Wilmington, Del.

Ingersoll Steel



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Tuesday, Oct. 20—9:30 a.m.

Ohio Room, Hotel Statler

Nonferrous

The System Zirconium-Aluminum—D. J. McPherson, supervisor, physical metals research, and M. Hansen, chairman, metals research department, Armour Research Foundation, Chicago.

Special Libraries Association

(Metals Division and Metals Section of Science-Technology Division)

Fall Meeting

October 21-23, 1953—Cleveland, Ohio

Wednesday, Oct. 21

Field trip to Battelle Memorial Institute, Columbus, O., to inspect library and research facilities of the Institute.

Thursday, Oct. 22

South Hall A—Public Auditorium

9:30 a.m.—Metal-Fabrication—Methods and Literature

Modern Methods for Joining Metals—Dr. P. T. Stroup, chief of the process metallurgy division, Aluminum Research Laboratories

Abstracting and Indexing Sources for Literature on Metals and Metal Fabrication—Ellis Mount, research associate, research information service, John Crerar Library

Services Available from Large Libraries—Prof. Esther M. Schlundt, head, readers division, Purdue University

2:00 p.m.—Fundamentals of the Newer Metals

Materials for Use at Elevated Temperatures—Dr. W. J. Harris Jr., executive secretary, Minerals & Metals Advisory Board, National Academy of Sciences

Metallic Materials for Nuclear Reactors—Frank G. Foote, director, metallurgical division, Argonne National Laboratory

6:30 p.m.—Dinner with Cleveland Chapter, S.L.A., Mather Room, Hotel Allerton

8:15 p.m.—Methods for Improvement of Reading Speed and Efficiency, as Developed at Case Institute of Technology—Harold Johnson, director, reading improvement laboratory, Case Institute of Technology

Friday, Oct. 23

10:00 a.m.—Technical Session, Thomlinson Hall, Case Institute of Technology

Operations Research as a Metallurgical Tool—C. West Churchman, Case Institute of Technology

Techniques in Report Writing—Robert L. Shurter, professor and director, humanistic social division, Case Institute of Technology

12:30 p.m.—Luncheon, Crosby's Restaurant, 10505 Carnegie Ave.

2:00 p.m.—Visit to Warner & Swasey Co. Taking the Mystery out of Machine Tools (An informal discussion—Warner Seely, vice-president of public relations; followed by inspection trip of library and plant

Observations on the Behavior of Hydrogen in Zirconium—C. M. Schwartz and M. W. Mallett, Battelle Memorial Institute, Columbus, O.

Recrystallization Applied to Control of the Mechanical Properties of Molybdenum—J. H. Bechtold, Westinghouse Electric Corp., E. Pittsburgh, Pa

Tuesday, Oct. 20—2 p.m.

Ballroom, Public Auditorium

Physical Metallurgy

Supercooling and Dendritic Freezing in Alloys—W. C. Winegard and B. Chalmers, University of Toronto, Toronto.

Another Look at Quenchants, Cooling Rates and Hardenability—D. J. Carney, United States Steel Corp., South Works, Chicago.

Effect of Pearlite Spacing on Transition Temperature of Steel at Four Carbon Levels—J. A. Rinebolt, metallurgist, Naval Research Laboratory, Washington.

Elevation of Critical Temperatures in Steel by High Heating Rates—W. J. Feuerstein, metallurgist, and W. K. Smith, head, metallurgy section of materials evaluation branch, U. S. Naval Ordnance Test Station, China Lake, Calif.

Wednesday, Oct. 21—9 a.m.

Ballroom, Hotel Statler

ASM Annual Meeting

Campbell Memorial Lecture—Donald S. Clark, California Institute of Technology

Wednesday, Oct. 21—2 p.m.

Ballroom, Public Auditorium

Boron

A Hypothesis for the Boron Hardenability Mechanism—J. W. Spretnak and Rudolph Speiser, associate professors, department of metallurgy, Ohio State University, Columbus, O.

Effect of Boron on Notch Toughness and Temper Embrittlement—A. E. Powers and R. G. Carlson, turbine division, General Electric Co., Schenectady, N. Y.

A Study of the Fe-Fe2B System—C. C. McBridge, Savannah River Plant, E. I. duPont deNemours & Co., Augusta, Ga., and J. W. Spretnak and Rudolph Speiser, associate professors, department of metallurgy, Ohio State University, Columbus, O.

Carbonitriding of Boron Steels—G. W. Powell, M. B. Bever and C. F. Floe, Massachusetts Institute of Technology, Cambridge, Mass.

Thursday, Oct. 22—9:30 a.m.

Ballroom, Public Auditorium

Tempering

Effect of Silicon on Kinetics of Tempering—W. S. Owen, University of Liverpool, Liverpool, Eng.

Microstructural Changes on Tempering Iron-Carbon Alloys—B. S. Lement, B. L. Averbach and M. Cohen, Massachusetts Institute of Technology, department of metallurgy, Cambridge, Mass.

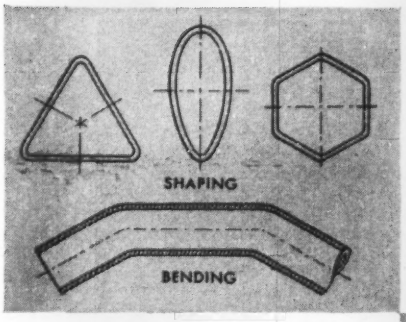
Effect of Chemical Composition on Susceptibility of Steels to Temper Brittleness—Ralph Hultgren, professor of metallurgy and John Chuan Chang, University of California, Berkeley, Calif.

Thursday, Oct. 22—9:30 a.m.

Club Room B, Public Auditorium

Constitution

Equilibrium Structures in Fe-Cr-Mo Alloys—J. G. McMullin, S. F. Reiter and D. G. Ebeling, research laboratory, General Electric Co., Schenectady, N. Y.



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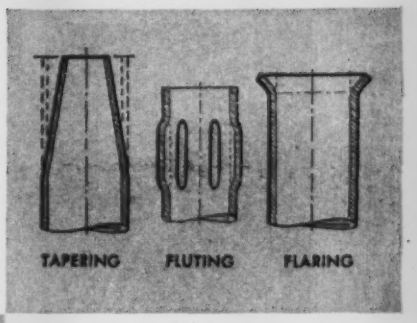

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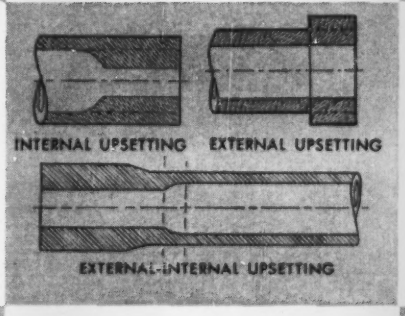
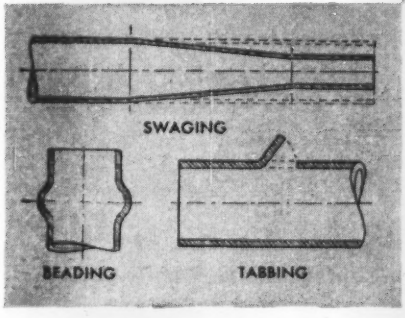
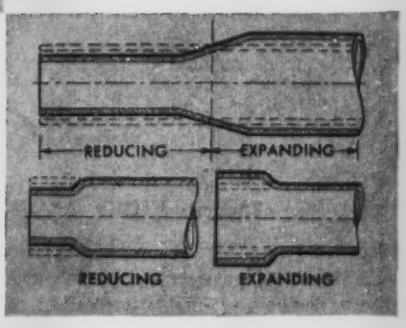


OSTUCO TUBING is versatile!



OSTUCO TUBING is versatile!



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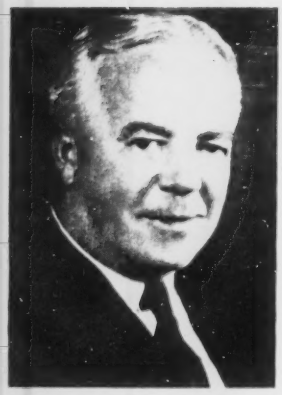
DR. GEORGE SACHS
Recipient, ASM Gold Medal



HILAND GARFIELD BATCHELLER
Recipient, ASM Medal for Advancement of Research

WILLIAM T. ENNOR
Recipient, ASM Albert Sauveur Achievement Award

A Survey of Vanadium Binary Systems—W. Rostoker, senior metallurgist and A. Yamamoto, associate metallurgist, Armour Research Foundation, Chicago.

Gamma Loop Studies in the Iron-Vanadium and Iron-Vanadium-Titanium Systems—W. R. Lucas, graduate student and W. P. Fishel, professor of metallurgy, Vanderbilt University, Nashville, Tenn.

Thursday, Oct. 22—2 p.m.

Ballroom, Public Auditorium

Stainless and High-Speed Steel

High Temperature Transformations in Ferritic Stainless Steels Containing 17 to 25 per cent Chromium—A. E. Nehrenberg, supervisor, research laboratory, and Peter Lillys, research metallurgist, Crucible Steel Co. of America, Harrison, N. J.

Intergranular Corrosion of Ferritic Stainless Steels—R. A. Lula, A. J. Lena and G. C. Kiefer, Allegheny Ludlum Steel Corp., Brackenridge, Pa.

Grain Growth in High Speed Steel—Eric Kula and Morris Cohen, department of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

Discontinuous Grain Growth in High Speed Steel—A. H. Grobe, research metallurgist, G. A. Roberts, chief metallurgist, and D. S. Chambers, Vanadium-Alloys Steel Co., Latrobe, Pa.

Friday, Oct. 23—9:30 a.m.

Ballroom, Public Auditorium

Mechanical

Strain Aging Behavior of Rheotropically Embrittled Steel—E. J. Ripling, assistant professor, Department of Metallurgy, Case Institute of Technology, Cleveland.

Flow and Fracture of Single Crystals of High Purity Ferrite—R. P. Steijn, assistant professor, Rice Institute, Houston, and R. M. Brick, professor of metallurgy, University of Pennsylvania, Philadelphia.

Notched Bar Tensile Properties of Various Materials and Their Relation to the Unnotch Flow Curve and Notch Sharpness—Harry Schwartzbart, research metallurgist, Armour Research Foundation, Chicago, and W. F. Brown Jr., research metallurgist, National Advisory Committee for Aeronautics, Cleveland.

AMERICAN WELDING SOCIETY PROGRAM

All Sessions at Hotel Cleveland

Monday Morning, Oct. 19

A-Prize Awards and Adams Lecture (Ballroom)

Chairman—F. L. Plummer, president, AWS
Co-chairman—H. C. Boardman, chairman, National Program Committee

Aspects of Welding Research in British Merchant Shipbuilding—R. B. Shepheard, Shipbuilding Conference.

Monday Afternoon, Oct. 19

Two Simultaneous Sessions

1. Gouging and Cutting (Ballroom)

Chairman—Richard L. Deily, Air Reduction Sales Co.
Co-chairman—R. S. Babcock, Linde Air Products Co.

The Arcair Process—Myron D. Stepath, Arcair Co.

Shielded Metal-Arc Cutting and Grooving—Helmut Thielsch and J. Quaas, Eutectic Welding Alloys Corp.

Advanced Automatic Flame Cutting for Machinery Weldments—Howard B. Cary, Marion Power Shovel Co.

2. Resistance Welding (Red Room)

Chairman—R. E. Powell, Western Electric Co.
Co-chairman—John Diebold, Diebold Engineering Sales Co.

Radiography of Spot Welds—Robert C. McMaster, Battelle Memorial Institute.

Resistance Welding in Jet Engine Manufacturing—Frank J. Wallace, Pratt & Whitney, Whitney Aircraft Division, United Aircraft Corp.

A Study of the Cooling Rates in Flash Welds in Steel—Ernest F. Nippes, Warren F. Savage and Gordon Grotke, Rensselaer Polytechnic Institute.

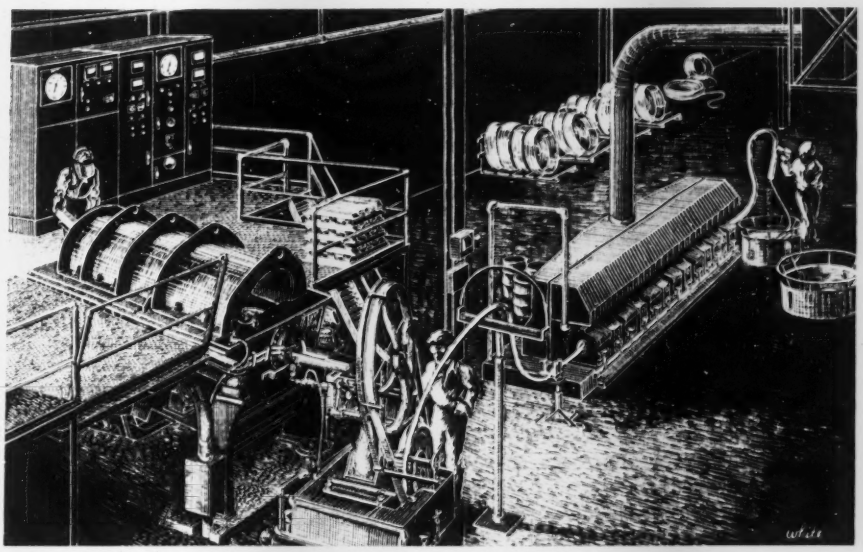
Some Applications of High-Speed Motion Picture Photography to Resistance Welding—I. S. Goodman, Westinghouse Electric Corp.

Monday Evening, Oct. 19

President's Reception (Ball Room)

National Officers Dinner

From Molten Aluminum to 3/8" Diameter Rod in 1½ Minutes!



Rome Cable Corporation

uses **AJAX INDUCTION FURNACES** for

MELTING ALUMINUM FOR CONTINUOUS CASTING AND ROLLING OF HIGH CONDUCTIVITY ROD

The picture above, a drawing made at the Rome Cable Corporation, Rome, N. Y., shows one of the most modern installations in the country for the continuous casting and rolling of aluminum rod directly from molten metal. From left to right are shown the electric controls of the adjacent 450 kW. AJAX low frequency induction combined melting and holding furnace which is pouring molten metal into the Properzi continuous casting machine in the foreground, and the rolling mill from which the coiled rod is emerging.

This installation casts at the rate of about one ton per hour. The furnace feeds a continuous stream of molten aluminum at automatically controlled temperature into a rim cavity on the slowly revolving wheel of the Properzi machine. Metal loss from pig to rod averages less than 1 pct. Mechanical properties and electrical conductivity are excellent; the material is sound and fine grained. The men work under cooler, cleaner conditions because the only heat generated is within the melt itself. Due to melting conditions inherent in AJAX furnaces, the operation is continuous and no fluxing is required.

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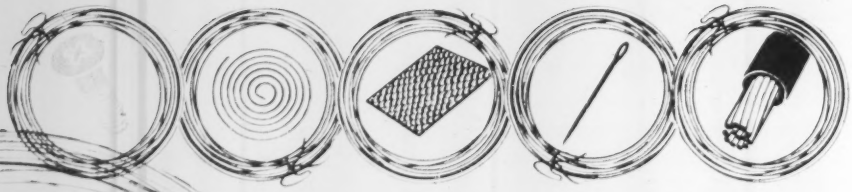
AJAX ELECTRO METALLURGICAL CORP., and Associated Companies
AJAX ELECTROTHERMIC CORP., For Melting High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., For Non-Ferrous Electric Salt Bath Furnaces
AJAX ELECTRIC FURNACE CORP., For Steel Induction Furnaces for Melting



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REX HIGH SPEED • TOOL • REZISTAL STAINLESS • MAX-EL • ALLOY • SPECIAL PURPOSE STEELS

Tuesday Morning, Oct. 20

Three Simultaneous Sessions

1. Stainless Steel (Ballroom)

Chairman—F. W. Davis, U. S. Atomic Energy Commission
Co-chairman—V. N. Krivobok, International Nickel Co. Inc.

Effects of Various Heat Treatments on Modified 347 Weld Deposits—R. D. Thomas Jr. and Lorin K. Poole, Arcos Corp.

Silver Brazing Alloys for Corrosion-Resistant Joints in Stainless Steels—George H. Sistare, Handy & Harman, L. H. Grenell, General Motors Corp. and John J. Halbig, Armco Steel Co.

Submerged Arc Welding of Chromium-Bearing Steels—Clarence E. Jackson and Arthur E. Shrubsall, Union Carbide & Carbon Laboratories.

2. Titanium (Empire Room)

Chairman—F. R. Hensel, P. R. Mallory & Co.
Co-chairman—G. Grable, Battelle Memorial Institute

Tension, Shear and Impact Strengths of Spot-Welded Titanium Joints—M. L. Begeman, E. H. Block Jr. and Frank W. McBee Jr., University of Texas.

Fusion Welding Commercially Pure Titanium—Francis H. Stevenson, Aerojet General Corp.

Alloy Filler Metals in Commercially Pure Titanium—Carl E. Hartbower, Watertown Arsenal Laboratory.

3. Structural (Red Room)

Chairman—Bruce G. Johnston, University of Michigan
Co-chairman—Ross Yarrow, Consolidated Iron & Steel Co.

Residual Stress and Inelastic Bending of WF Columns—Robert L. Ketter, Lynn S. Beedle, Lehigh University, and E. L. Kaminsky, David Taylor Model Basin.

Weldability of Structural Steel Discussed from the Viewpoint of Federal Agencies—E. L. Erickson, chief, bridge branch, Bureau of Public Roads.

Development of Welded Bridge Construction—N. W. Morgan, principal highway bridge engineer, Bureau of Public Roads.

Recent Applications of Welded Design to Industrial Building Framings.

Tuesday Afternoon, Oct. 20

Two Simultaneous Sessions

1. Aluminum and Aircraft (Ballroom)

Chairman—R. S. Green, Ohio State University
Co-chairman—Charles Bruno, Reynolds Metals Co.

Soldering of Aluminum—James D. Dowd, Aluminum Co. of America.

Fatigue Strength of Welded Butt Joints in $\frac{3}{8}$-inch Thick Aluminum Alloy Plates—E. C. Hartmann, Marshall Holt and I. D. Eaton, Aluminum Co. of America.

Some Considerations on Weldability of Aluminum Alloys—J. Koziarske, Piasecki Helicopter Corp.

2. Weldability (Red Room)

Chairman—R. E. Somers, Bethlehem Steel Co.
Co-chairman—J. Robert Henry, Cleveland Diesel Division, General Motors Corp.

Cracking in High-Temperature Alloys as Related to Microstructure—W. R. Apblett and W. S. Pellini, Naval Research Laboratory.

Ductility Transition Characteristics of Weld Metal—Earl Eschbacher and W. S. Pellini, Naval Research Laboratory.

Further Studies on Weld-Metal Microcracking in Mild Steel—A. E. Flanigan, University of California.

Wednesday Morning, Oct. 21

Three Simultaneous Sessions

1. Weldability (Ballroom)

Chairman—L. C. Bibber, United States Steel Co.
Co-chairman—G. E. Claussen, Union Carbide & Carbon Research Laboratories Inc.

Army First-Pass Groove Weld Crack Susceptibility Test—Z. J. Fabrykowski, S. Goodman and B. A. Schevo, Detroit Arsenal.

Low-Temperature Bend-Test Properties of Bead-on-Plate Welds—L. S. Harris, R. B. Matthiesen and N. M. Newmark, University of Illinois.

Fatigue Properties of Weld Metal—L. S. Harris, R. B. Matthiesen and N. M. Newmark, University of Illinois.

2. Titanium (Empire Room)

Chairman—Col. B. S. Mesick, Ordnance Corps, Watertown Arsenal
Co-chairman—W. L. Warner, Watertown Arsenal

A Study of the Weld Heat-Affected Zones in Titanium Alloys—Ernest F. Nippes, John M. Gerken and Bernard W. Schaaf, Rensselaer Polytechnic Institute.

Welding Characteristics of Titanium and Titanium Alloys—Mario L. Ochicano, Lockheed Aircraft Corp.

Study of the Effects of Alloying Elements on Weldability of Titanium Sheet—Dr. Max Hansen, Armour Research Foundation.

3. Controls and Inspection (Red Room)

Chairman—Gilbert S. Schaller, University of Washington
Co-chairman—R. J. Kriz, James B. Herron Co.

Inspection Techniques for Quality Welding Production—Lew Gilbert, *Industry and Welding*, and William B. Bunn, M. W. Kellogg Co.

Nondestructive Testing as an Aid to Increased Use of Welding for Steel Structures—Lloyd J. Oye, Magnaflux Corp.

Tolerances on Fillet Welds—John Mikulak, and Merle B. Dillman, Worthington Corp.

Wednesday Afternoon, Oct. 21

Three Simultaneous Sessions

1. Pipe (Ballroom)

Chairman—A. J. Erlacher, United Engineers & Constructors Inc.
Co-chairman—N. C. Jessen, Babcock & Wilcox Co.

Further Studies of Arc Welding of Low-Chromium Molybdenum Steel Pipe—J. Bland, Standard Oil Co. of Indiana.

Superheaters for 1100° to 1500° F Test Installation—Bela Ronay and W. E. Clautice, U. S. Naval Engineering Experiment Station.

Carbide Segregation and Decarburization at Welded Joints—I. A. Rohrig, Detroit Edison Co. and H. S. Blumberg, M. W. Kellogg Co.

2. Research (Red Room)

Chairman—G. E. Doan, Koppers Co. Inc.
Co-chairman—Frank Flocke, Thornton Co.

Welding Metallurgy of Nodular Cast Iron—Edward E. Hucke and Prof. H. Udin, Massachusetts Institute of Technology.

Effect of Low-Temperature Stress Relieving on Stress-Corrosion Cracking of Mild Steel—C. R. McKinsey, Union Carbide & Carbon Research Laboratories Inc.

Transformation of Cr-Mo Steels During Welding—W. R. Apblett Jr., R. P. Dumphy and W. S. Pellini, Naval Research Laboratory.

Multiple Contact Resistance—W. B. Kouwenhoven and Donald R. Hagner, Johns Hopkins University.

3. Education (Empire Room)

Chairman—Dean A. Potter, Purdue University
Co-chairman—Prof. M. L. Begeman, University of Texas

Teaching Engineering Fundamentals—Dean S. C. Hollister, Cornell University.

Discussion: Dean W. B. Kouwenhoven, Johns Hopkins University and Prof. R. S. Green, Ohio State University.

Teaching Welding Design—Dr. J. P. Vidosic.

Wednesday Evening, Oct. 21

Section Officers Dinner

WRC University Dinner and Conference

Thursday Morning, Oct. 22

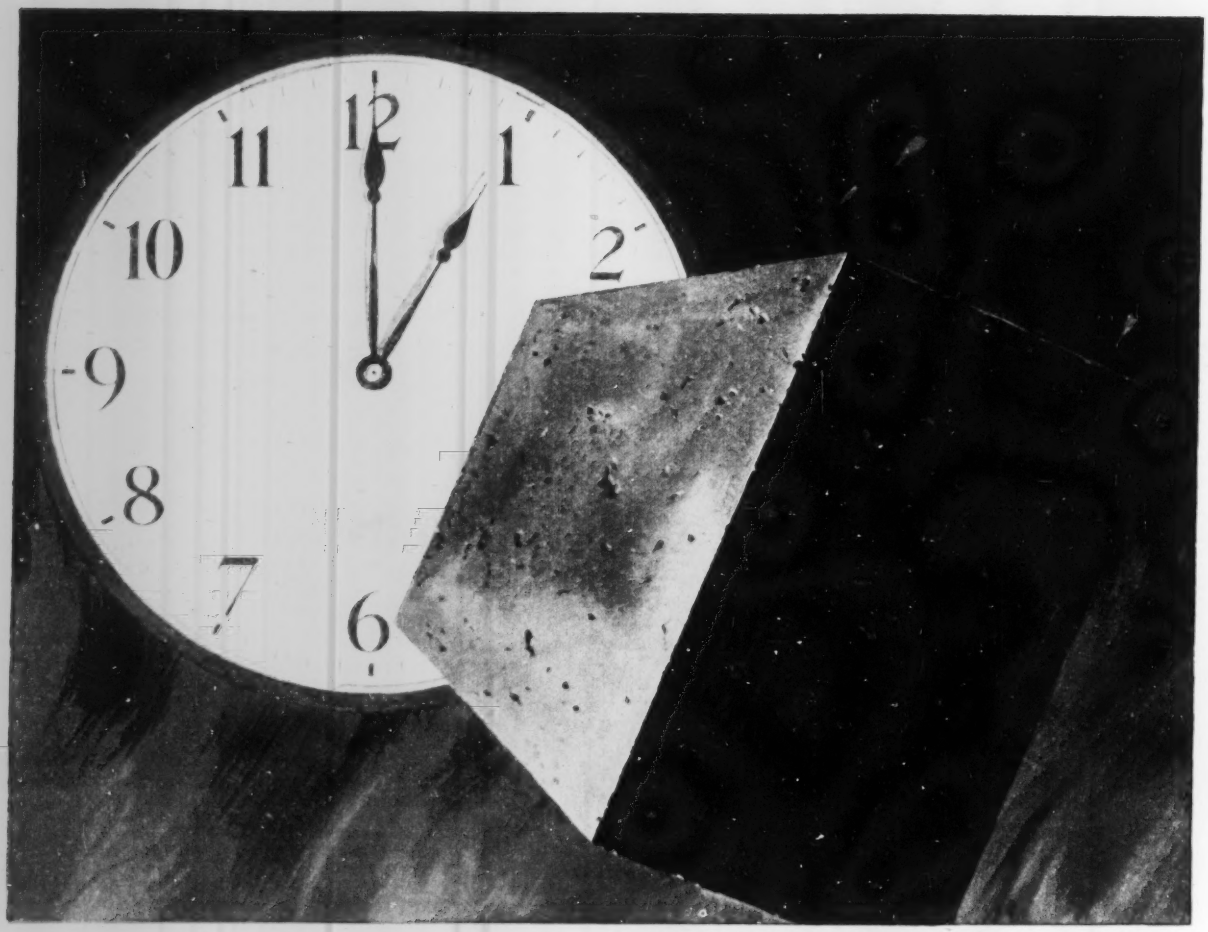
Three Simultaneous Sessions

1. Pressure Vessels and Research (Ballroom)

Chairman—T. N. Armstrong, International Nickel Co. Inc.
Co-chairman—L. J. Larson, Allis-Chalmers Mfg. Co.

Plastic Fatigue Strength of Pressure Vessel Steels—Robert D. Stout, John H. Gross and D. E. Gucer, Lehigh University.

A Qualitative Study of Residual Stresses in Welds by Photo-elasticity—Dr. Melvin Mark, Raytheon Mfg. Co.



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When you use Permanente *Periclase* basic brick in your steel furnaces you can be sure of longer life in service, less down-time for replacement and repair, extra tonnage every hour.

The outstanding quality of Permanente basic brick has been proved in the furnaces of many of the nation's largest steel producers. Here are a few of its many advantages:

Pre-shrunk, accurately-sized periclase grains derived from sea-water magnesia • Ceramic bond achieved through solid phase reaction • Absence of liquids at operating temperatures • High refractoriness • Maximum density • Resistant to slag attack • High hot load strength • Maximum resistance to abrasion • Superior spall resistance • Excellent volume stability • Clean edges; accurate dimensions

PD-B (Periclase "D" burned) brick for open hearth and electric furnace bottoms. Low in iron, lime and silica. Chrome free. Maximum MgO in bottom.

PCA, PCA-MC (Periclase-Chrome "A"), plain and metal-encased for open hearth end walls, front walls and uptakes. Metal-encased for electric furnace sidewalls. High in MgO. Outstanding all-purpose refractory.

CPA-B (Chrome-Periclase "A" burned) for open hearth front and back walls. Controlled chrome additives result in highest resistance to spalling.

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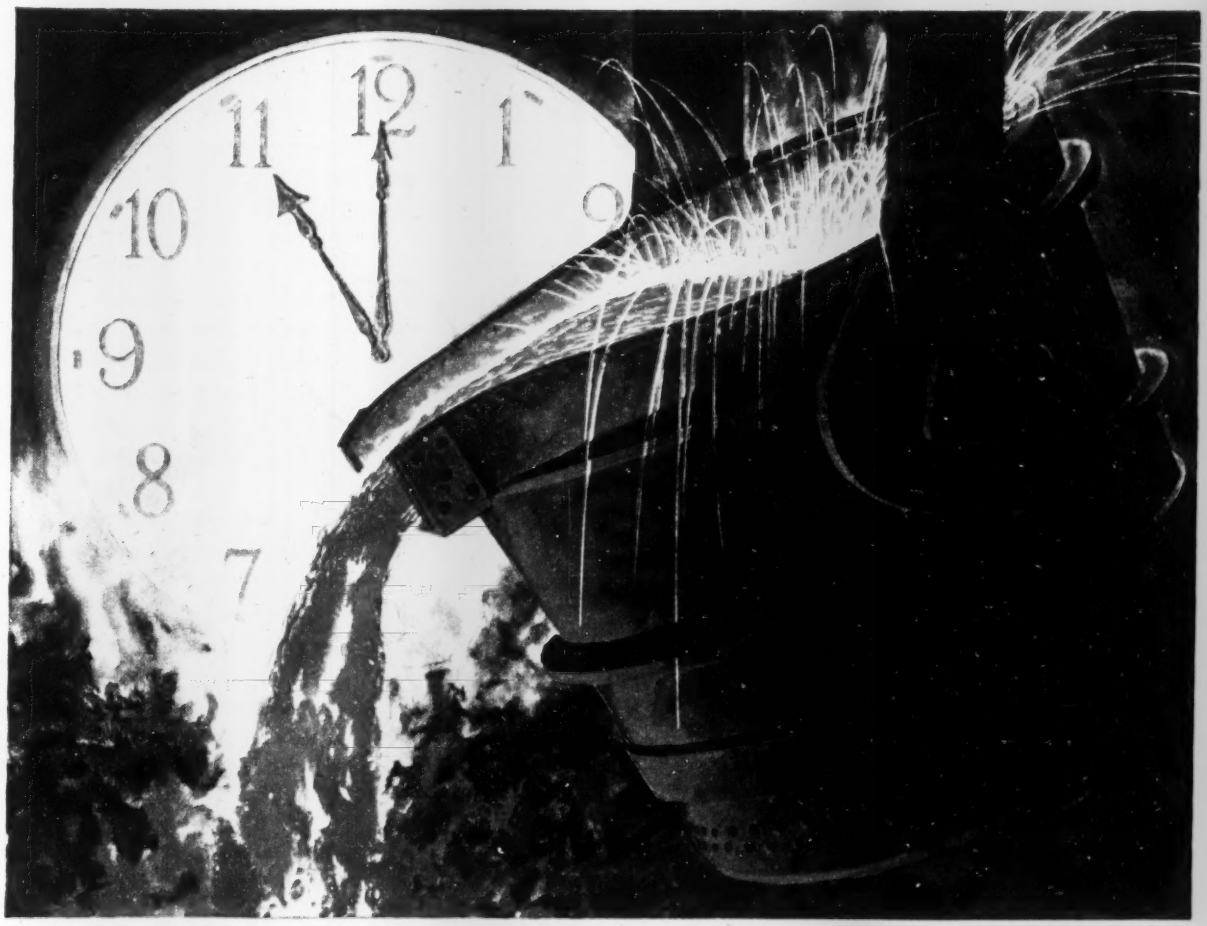


Extra Tonnage every hour... WITH PERMANENTE 165!

Reports from leading steel producers using Permanente 165 ramming mix for open hearth bottoms show that:

Many furnaces are "tripling"... original tap holes are lasting up to 80 heats without repiping... production records are being broken, with extra tonnage every hour.

Chances are that the proved superiority of a Permanente 165 bottom, based on records of scores of furnaces, can boost *your* open hearth production well above current rates.

Such performance is possible because patented Permanente 165 is a high MgO *periclase* ramming material derived from sea water magnesia of highest purity.

Pre-shrunk and accurately sized periclase grains assure a bottom of great volume stability — another of Permanente 165's more than *20 quality advantages.*

Your Kaiser refractory engineer will give prompt attention to your refractory problem... will offer, where desired, research, design and installation service to give you maximum production most economically. Write for descriptive literature on (1) Permanente 165, (2) the companion ramming mix, Permanente 84, and (3) Permanente Refractory Brick. Principal sales offices: Chemical Division, Kaiser Aluminum & Chemical Sales, Inc., 1924 Broadway, Oakland 12, California; First National Tower, Akron 8, Ohio.

Kaiser Chemicals

Basic Refractory Brick and Ramming Materials

Effect of Nitrogen and Carbon Dioxide Atmospheres on Arc Welding—Professors Sowa, Truckenmiller and Wagner, University of Michigan.

Biaxial Fatigue Properties of Pressure-Vessel Steels—T. J. Dolan and C. E. Bowman, University of Illinois.

2. Inert Arc Welding (Red Room)

Chairman—C. I. MacGuffie, General Electric Co.
Co-chairman—H. E. Rockefeller, Linde Air Products Co.

Inert-Gas-Shielded Metal-Arc Welding of Low-Carbon Steels—George C. Christopher and R. C. Becker, International Harvester Co.

Characteristics of Consumable-Electrode Inert Arcs—R. W. Tuthill, General Electric Co.

Effect of Power Supply Characteristics on Sigma Welding—W. H. Helmbrecht and R. L. Hackman, Linde Air Products Co.

Weld Properties of a Carbon-Steel Electrode for Use with Inert Gas Shields—Harry C. Cook and Gilbert R. Rothschild, Air Reduction Research Laboratories.

3. Automatic Arc (Empire Room)

Chairman—C. C. Peck, Cecil C. Peck Co.
Co-chairman—L. S. McPhee, Whiting Corp.

New Developments in Fluxes for Automatic Welding and Hard Surfacing—L. K. Stringham, Lincoln Electric Co.

Multiple Electrode Welding by the Unionmelt Process—D. E. Knight, Linde Air Products Co.

Multiple-Arc Submerged Arc Welding—Theodore Ashton, Lincoln Electric Co.

Thursday Afternoon, Oct. 22

(Ballroom)

Board of Directors Meeting

Annual Business Meeting

Thursday Evening, Oct. 22

Annual Dinner (Ballroom)

Friday Morning, Oct. 23

Three Simultaneous Sessions

1. Applications (Ballroom)

Chairman—C. B. Herrick, C. B. Herrick Co.

New Welding Shop Facilities, Methods and Equipment at the Whiting Refinery—Ray M. Kolb and R. C. Wheeler, Standard Oil Co. of Indiana.

Silver and Gold for Brazing Electronic Components—A. W. Swift and R. J. Metzler, Handy & Harman.

New Results in Tool and Die Welding—Robert H. Groman, Eutectic Welding Alloys Corp.

Austenitic Manganese Steel Welding Electrodes—Howard S. Avery and Henry J. Chapin, American Brake Shoe Co.

2. Inert Arc Welding (Red Room)

Chairman—R. M. Wilson, International Nickel Co.
Co-chairman—A. R. Lytle, Electro Metallurgical Co.

A New Method to Prevent Rectification of Current and High-Frequency Interference in Inert-Gas Arc Welding—John Murray, Lincoln Electric Co.

New Developments in Sigma Welding of Carbon Steel—T. McElrath Jr., and R. T. Telford, Linde Air Products Co.

Porosity in Welding Carbon Steel—Glenn W. Oyler and Robert D. Stout, Lehigh University.

3. Field-Erected Structures (Empire Room)

Chairman—E. MacCutcheon, Bureau of Ships, U. S. Navy
Co-chairman—L. C. McNutt, United Engineers & Constructors Inc.

Scale Effects in Notch Brittleness—Yoshio Akita, Transportation Technical Research Institute.

Effect of Subcritical Heat Treatment on Transition Temperature of a Ship Plate Steel—E. B. Evans and L. J. Klingler, Case Institute of Technology.

Welded Mexican Bridge—Thomas C. Kavanagh, New York University.

INSTITUTE OF METALS DIVISION PROGRAM

All Sessions at Hotel Allerton

Monday, Oct. 19, 9 a.m.

Two Simultaneous Sessions

Plastic Deformation Session

(Ballroom)

Plasticity of Columbium Single Crystals—R. Maddin and N. K. Chen, Johns Hopkins University.

Plastic Deformation of Iron Between 300° and 77.2°K—Donald F. Gibbons, Royal Military College of Canada.

Deformation of Ferrite Single Crystals—F. L. Vogel Jr. and R. M. Brick, University of Pennsylvania.

Plastic Stress-Strain Relations for 14S-T6 Subjected to Combined Tension and Torsion—Joseph Marin and A. B. Wiseman, Pennsylvania State College.

Metallography Session

(Mather Room)

Revealing the Subgrain Structure of Aluminum—M. S. Hunter and D. L. Robinson, Aluminum Co. of America.

Grain Boundary Attack on Aluminum in Hydrochloric Acid and Sodium Hydroxide—E. C. W. Perryman, Aluminum Laboratories Ltd.

Microscopical Examination of Tin Bronzes in the Alpha Range—E. C. W. Perryman, Aluminum Laboratories Ltd.

Identification of the Precipitate Accompanying 885°F Embrittlement in Chromium Steels—R. M. Fisher, E. J. Dulis and K. G. Carroll, United States Steel Corp.

Measurement of Particle Sizes in Opaque Bodies—R. L. Fullman, General Electric Co. Journal of Metals, March 1953.

Measurement of Approximately Cylindrical Particles of Opaque Samples—R. L. Fullman, General Electric Co. Journal of Metals, September 1953.

Monday, Oct. 19, 2 p.m.

Three Simultaneous Sessions

Plastic Deformation Session

(Ballroom)

Plastic Deformation of Single Crystals of Copper—J. J. Becker, General Electric Research Laboratory, and J. N. Hobstetter, Bell Telephone Laboratories.

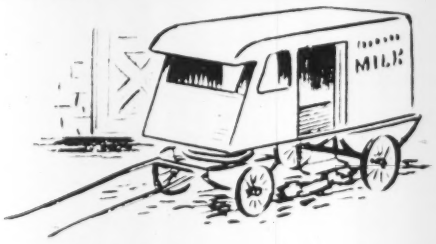
Orientation Relationships in the Recrystallization of Deformed Copper Single Crystals—J. J. Becker, General Electric Research Laboratory and J. N. Hobstetter, Bell Telephone Laboratories. Journal of Metals, September 1953.

Plastic Deformation of Rectangular Zinc Monocrystals—John J. Gilman, Columbia University. Journal of Metals, September 1953.

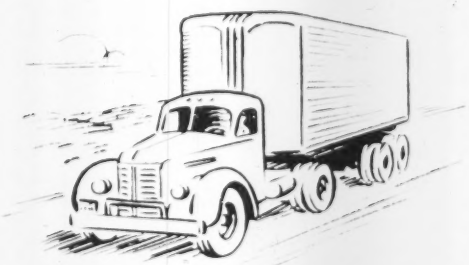
Variation of Plastic Properties with Annealing Procedure in Zinc Single Crystals—Choh Hsien Li, Jack Washburn and Earl R. Parker, University of California. Journal of Metals, September 1953.

King FIFTH WHEEL COMPANY'S

50th Anniversary



1904 to 1954 . . . years which have embraced wars, depressions, talkies, radio, TV and now 3-D! Success and failures, revivals of old ideas, creations of new; hirings, firings, labor contracts, re-openings, all-color markets . . . These have been an exciting 50 years . . . To begin our celebration we of King are staking out a claim at the National Metal Exposition. You are most cordially invited to visit with us to reminisce, to forecast or just plain relax. Lord knows we'll need rest before we start on another half century!



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Recovery in Single Crystals of Zinc—R. Drouard, Paris, Jack Washburn and Earl R. Parker, University of California. Journal of Metals, September 1953.

Some Observations on the Work Hardening of Metals—E. H. Edwards, Jack Washburn and E. R. Parker, University of California. Journal of Metals.

Thermodynamics

(Mather Room)

Some Applications of the Thermodynamic Theory of Irreversible Processes to Physical Metallurgy—E. S. Machlin, Columbia University.

Vapor Pressure of Silver Over Silver-Gold Solid Solutions—C. L. McCabe, H. M. Schadel Jr. and C. E. Birchenall, Carnegie Institute of Technology.

Vapor Pressure of Silver—C. L. McCabe and C. E. Birchenall, Carnegie Institute of Technology.

High Pressure Oxidation Rate of Metals — William McKewan, New Jersey Zinc Co. of Pennsylvania and W. Martin Fassell Jr., University of Utah.

Self-Diffusion of Iron in Iron Oxides and the Wagner Theory of Oxidation—L. Himmel and R. F. Mehl, Carnegie Institute of Technology and C. E. Birchenall, Princeton University.

Decay of Lattice Defects Frozen into an Alloy by Quenching—A. E. Roswell and A. S. Nowick, Yale University.

Constitutional Diagrams Session

(Chester Room)

Ternary System Ti-Ta-C—John G. McMullin, General Electric Research Laboratories, and John T. Norton, Massachusetts Institute of Technology.

Titanium-Rich Corners of the Ti-C-N, Ti-C-O and Ti-N-O Phase Diagrams—L. Stone and H. Margolin, New York University.

System Titanium-Chromium-Iron—R. J. Van Thyne, H. D. Kessler and Dr. Max Hansen, Armour Research Foundation, Illinois Institute of Technology.

Molybdenum Boron System—P. W. Gilles and B. D. Pollock, University of Kansas.

Vanadium-Uranium Constitutional Diagram—H. A. Saller and F. A. Rough, Battelle Memorial Institute.

Order-Disorder Transformation in Cu-Au Alloys Near the Composition CuAu—J. B. Newkirk, General Electric Co.

Analysis of Molten Zone Refining—N. W. Lord, Raytheon Mfg. Co.

Monday, Oct. 19, 7:45 p.m.

Panel Discussion of Recrystallization

(Ballroom)

B. L. Averbach, Moderator

Paul A. Beck—"Do Metals Recrystallize?"
Cyril Stanley Smith—"Interfacial Energy and Recrystallization"
B. L. Averbach—"Recovery"
E. E. Stansbury—"Stored Energy and Recrystallization"
D. Turnbull—"Significance of Activation Energies"
J. E. Burke—"Recrystallization as a Nucleation and Growth Process"
Robert Maddin—"Textures and Recrystallization"

Tuesday, Oct. 20, 9 a.m.

Two Simultaneous Sessions

Transformation Session

(Chester Room)

Silver-Cadmium Eutectoid—G. R. Speich, Westinghouse Electric Corp. and D. J. Mack, University of Wisconsin.

Diffusionless Phase Change in the Indium Thallium System—M. W. Burkart and T. A. Read, Columbia University.

On the Theory of Formation of Martensite—M. S. Wechsler, D. S. Lieberman and T. A. Read, Columbia University.

Rate of Propagation of Martensite—R. F. Bunshah and R. F. Mehl, Carnegie Institute of Technology.

Rate of Formation of Isothermal Martensite in Fe-Ni-Mn Alloy—R. E. Cech and J. H. Hollomon, General Electric Co.

Calculation of Mertensite Nucleus Energy Using the Reaction-Path Model—J. C. Fisher and D. Turnbull, General Electric Co.

Martensite Nucleation in Substitutional Iron Alloys—John C. Fisher, General Electric Co.

Stabilization of Austenite-Martensite Reaction in a High Chromium Steel—S. C. Das Gupta and B. S. Lement, Massachusetts Institute of Technology.

Symposium on Physical Metallurgy of Titanium and Its Alloys

(Ballroom)

M. A. Hunter and H. A. Jackson, chairmen

Hardening and Embrittlement of Beta Stabilized Titanium Alloys—W. M. Parris, M. Young, A. J. Griest Jr. and P. D. Frost, Battelle Memorial Institute.

Titanium Base Alloys for Elevated Temperatures—Harold Kessler, Armour Research Foundation.

Development of Titanium Alloys—Schuyler Heries, Titanium Metals Corp. of America.

Heat Treatment, Structure and Mechanical Properties of Titanium-Manganese Alloys—F. C. Holden, H. R. Ogden and R. I. Jaffee, Battelle Memorial Institute.

Heat Treatment and Alloying of Titanium—L. D. Jaffee, Watertown Arsenal Laboratory.

Tuesday, Oct. 20, 2 p.m.

Research in Progress Session

(Mather Room)

Heat Treatment of Titanium Alloys Generalized in Terms of B'—Leonard D. Jaffee, Watertown Arsenal.

Solid State Bonding of Aluminum and Nickel—S. Storchheim, J. L. Zambrow and H. H. Hausner, Sylvania Electric Products Inc.

Grain Boundary Creep—F. N. Rhines, Carnegie Institute of Technology.

Spread in Orientations Among Microregions in Cast and Deformed Crystals—W. C. Ellis, Bell Telephone Laboratories Inc.

Growth Structures Formed During Solidification of Metal Crystals—C. Elbaum and B. Chalmers, Harvard University.

Curie Temperatures of Certain Ternary Sigma Alloys—M. V. Nevitt and P. A. Beck, University of Illinois.

Effect of Grain Size on Ultrasonic Transmissibility—Nicholas Grossman, Sylvania Electric Products Inc.

Mechanism of Plastic Flow in Titanium at Low and High Temperatures—F. D. Rosi and F. C. Perkins, Sylvania Electric Products Inc.

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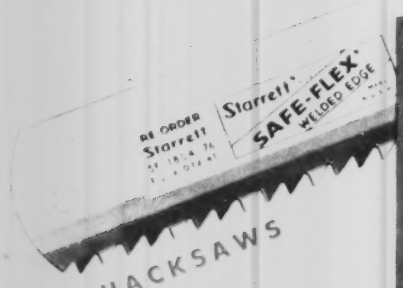

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Creep Session
(Chester Room)

Inhomogeneity in Creep Deformation of Coarse Grained High Purity Aluminum—H. C. Chang and N. J. Grant, Massachusetts Institute of Technology.

Subgrain Formation in High-Purity Aluminum During Creep at High Temperatures—Andre M. Gervais, Societe Commentry-Fouchambault et Decazeville, John T. Norton and Nicholas J. Grant, Massachusetts Institute of Technology.

Metallographic Observations of the Deformation of High-Purity Magnesium in Creep at 500°F—A. R. Chaudhuri, N. J. Grant and J. T. Norton, Massachusetts Institute of Technology.

Creep Behavior of Extruded Electrolytic Magnesium—C. S. Roberts, Dow Chemical Co.

Further Progress in the Development of Mg-Zr Alloys to Give Good Creep and Fatigue Properties Between 500° and 650°F—C. J. P. Ball, A. C. Jessup, P. A. Fisher, D. J. Whitehead and J. B. Wilson, Magnesium Elektron Ltd.

Properties of Sand Cast Magnesium-Thorium Zinc-Zirconium Alloys—K. E. Nelson, Dow Chemical Co.

A Rationalizaton of Measured High Temperature Properties of Fe-Cr-Co-Ni Alloys—J. D. Nisbet and W. R. Hibbard Jr., General Electric Co.

Wednesday, Oct. 21, 2 p.m.
Two Simultaneous Sessions

Plastic Deformation of Titanium, Molybdenum and Zirconium Session
(Ballroom)

Deformation Mechanisms in Alpha Titanium—E. A. Anderson, D. C. Jillson and S. R. Dunbar, New Jersey Zinc Co. of Pennsylvania.

Cold Rolled Texture of Titanium—D. N. Williams and D. S. Eppelsheimer, University of Missouri.

Effects of Solid Solution Alloying on the Cold-Rolled Texture of Titanium—Carl J. McHargue, University of Kentucky, Sam E. Adair Jr., Linde Air Products, and Joseph P. Hammond, University of Kentucky.

Textures of Rolled and Annealed Iodide Zirconium—J. H. Keeler, W. R. Hibbard Jr. and B. F. Decker, General Electric Co.

Physical Metallurgy Session
(Chester Room)

Effects of Macrostructure on Performance of Alnico Permanent Magnets—Dolph G. Ebling, General Electric Co. and Arthur A. Burr, Rensselaer Polytechnic Institute.

Densification and Kinetics of Grain Growth During Sintering of Chromium Carbide—H. J. Hamjian, Utica Drop Forge and Tool Corp. and W. G. Lidman, Sylvania Electric Products Inc.

Influence of Aluminum and Silicon Deoxidation on Strain Aging of Low-Carbon Steels—W. C. Leslie and R. L. Rickett, U. S. Steel Corp.

Age Softening of Beta Brass—Harry Green, Horizons Inc. and Norman Brown, University of Pennsylvania.

Anelastic Behavior of Pure Gold Wire—Donald R. Mash and Lewis D. Hall, Stanford University.

Some Properties of Columbium Containing Nitrogen—Choh-Yi Ang and Charles Wert, University of Illinois.

Electrical Resistivity of Liquid Metals and of Dilute Liquid Metallic Solutions—E. Scala, Chase Brass & Copper Co. and W. D. Robertson, Yale University.

SOCIETY FOR NONDESTRUCTIVE TESTING

Educational Lectures

Suite 316—Hotel Hollenden

Monday, Oct. 19, 1953
General Chairman: S. A. Wenk, Battelle Memorial Institute

9:00 a.m.—Orientation Lecture Covering the Broad Purposes and Benefits of Nondestructive Testing—S. A. Wenk, Battelle Memorial Institute.

9:45 a.m.—Sources of Defects Located by Nondestructive Testing—C. E. Betz, Magnaflux Corp.

10:30 a.m.—Radiography—R. G. Tobey, Eastman Kodak Co.

11:15 a.m.—Magnetic Particle Inspection—W. E. Thomas, Magnaflux Corp.

2:15 p.m.—Testing with Ultrasonics—J. C. Smack, Sperry Products Inc.

3:00 p.m.—Inter-Relation of Various Testing Methods—A. Cota, A. O. Smith Corp.

3:15 p.m.—Evaluation of Indications of Discontinuities—J. H. Bly, X-Ray Inc.

4:30 p.m.—Question Period.

Technical Papers

All Sessions in Ballroom—Hotel Hollenden

Monday, Oct. 19, 9 a.m.

Call to Order—Gerold H. Tenney, Los Alamos Scientific Laboratory, General Chairman.

Opening Address—Robert C. McMaster, Battelle Memorial Institute, National President.

Welcome—Honorable Thomas A. Burke, Mayor of Cleveland.

Welcome—L. S. Ameron, Thompson Products Inc., Chairman of the Cleveland Section, Society for Nondestructive Testing.

Ten years Co-operation Between American Society for Metals and Society for Nondestructive Testing—Samuel L. Hoyt, Battelle Memorial Institute, representative of ASM.

Ten Years Co-operation Between Society for Nondestructive Testing and American Society for Metals—Carlton G. Lutts, Boston Naval Shipyard, first president of SNT.

Monday, Oct. 19, 2 p.m.

Radiography

Chairman—Roal G. Tobey, Eastman Kodak Co.
Co-chairman—Robert E. Reynolds, Lockheed Aircraft Corp.
Monitors—Don R. Wells, Cleveland Graphite Bronze Co.; D. F. Hauptman, Los Alamos Scientific Laboratory.

X-ray Focal Spot Measurement—D. T. O'Connor and D. Polansky, Naval Ordnance Laboratory.

A Preliminary Investigation on the Radiographic Visualization of Cracks— J. W. Dutli and G. H. Tenney, Los Alamos Scientific Laboratory.

Some Unusual Radiographic Problems—Michael D. Phillips, Merle L. Rhoten and Clara Kimmel, Battelle Memorial Institute.

An Investigation of Xeroradiography of Uranium with High-Energy Sources—R. E. Cofield, Carbide & Carbon Chemical Co.

Tuesday, Oct. 20, 9 a.m.

Betatron Radiography

Chairman—Richard F. Holste, General Electric Co.
Co-chairman—Carlton H. Hastings, Watertown Arsenal.
Monitors—James M. Robertson, Wellman Bronze & Aluminum Co.; Grover M. Taylor, Los Alamos Scientific Laboratory.

Characteristics of High Energy X-rays—A. L. Pace, X-ray department, General Electric Co.

Industrial Application of the 22 MEV Betatron—H. B. Norris, inspection department, Allis-Chalmers Mfg. Co.

Some Experimental Findings and Operating Practices in Betatron Radiography at Los Alamos—Norman C. Miller and John D. Steely, Los Alamos Scientific Laboratory.

Magnescanning (Betatron Magnification and Scanning Techniques)—A. N. Haig, Betatron Engineering, Allis-Chalmers Mfg. Co.

Further Investigations on the Industrial Use of 31 MEV Betatron—R. W. Wideroe, Brown Boveri & Co.

Tuesday, Oct. 20, 2 p.m.

Presentation of Awards

Chairman—Robert C. McMaster, National President
Je Forest Award—Magnaflux Corp.
Coolidge Award—General Electric Co., X-ray department.

Lester Honor Lecture—Adair Morrison, Arthur D. Little & Co.

Field Application of Radiography

Business Meeting.

Wednesday, Oct. 21, 7:30 a.m.

Breakfast Meeting—Hotel Hollenden

Wednesday, Oct. 21, 9 a.m.

Isotopes and Problems of Nondestructive Testing Here and Abroad

Chairman—William K. Lonsdale, James H. Herron Co.
Co-chairman—George T. Taylor, Radium Chemical Co., Inc.
Monitors—C. B. Williams, Massillon Steel Casting Co.; James E. Dodson, Los Alamos Scientific Laboratory.

Radioisotopes in Nondestructive Testing—Paul C. Aeberold, director, Isotope Division, Atomic Energy Commission.

Application of Cesium-137 to Industrial Radiography—Grover M. Taylor, Los Alamos Scientific Laboratory.

Quality Control Through Radiography as Offered by the Independent Commercial Laboratory—Alan S. Kollock, president, Industrial X-Ray Inc.

Nondestructive Testing in Great Britain—Robert Bentley, Ferranti Ltd., Eng.

Nondestructive Testing and the Society for Nondestructive Inspection in Japan—Vichi Hashimoto, professor, Tokyo University.

Gamma-Rays Machine (by Title Only)—Paul R. Oakes, vice-president and general manager, Gamma Industries Inc.

Use of Iridium-192 and Cobalt-60 in Industrial Radiography (by Title Only)—W. A. McCarthy, Tracerlab Inc.

Wednesday, Oct. 21, 2 p.m.

Ultrasonics

Chairman—William C. Hitt, Douglas Aircraft Co.
Co-chairman—John C. Smack, Sperry Products Inc.
Monitors—L. B. Haughwout, American Brake Shoe Co.; John D. Steely, Los Alamos Scientific Laboratory.

Calibration Problems in Ultrasonics Testing— H. E. Van Valkenburg, research engineer, Sperry Products Inc.

Inspection of Metals with Ultrasonics Surface Waves—Willard C. Minton, application engineer, Sperry Products Inc.

Immersed Ultrasonics Inspection with Automatic Recording or Warning Signal—John C. Smack, staff engineer, Sperry Products Inc.

High Resolving Power Ultrasonic Flaw Plotting Through Use of Frequency-Modulated Ultrasound—Don Erdman, president, Electro Circuits Inc.

Bi-Plexing Applications of the Improved Mark Eight 2-Ray Machine, A Dual Zonal Co-ordinating Scan Computor—H. H. Staats, manager, Magnaflux Corp.

Thursday, Oct. 22, 9 a.m.

Magnetic Particle and Penetrant Inspection

Chairman—Hamilton Migel, Magnaflux Corp.
Co-chairman—C. M. Tucker, Aluminum Co. of America
Monitors—Robert W. Devine Jr., Timken Roller Bearing Co.; A. D. Van Vassem, Los Alamos Scientific Laboratory.

Recent Developments in Penetrant Inspection—A. Robinson, General Electric Co.

Factors in Use of Black Lights for Fluorescent Inspection—J. E. Clarke, research director, Magnaflux Corp.

Application of Magnetic Particle Inspection in Refineries—T. C. Wilson, assistant chief inspector of refineries, Sinclair Refining Co.

Role of Nondestructive Testing in Ford's Quality Control Program—D. C. Hart, quality control, Ford Engine and Foundry Division, Ford Motor Co.

Thursday, Oct. 22, 1:30 p.m.

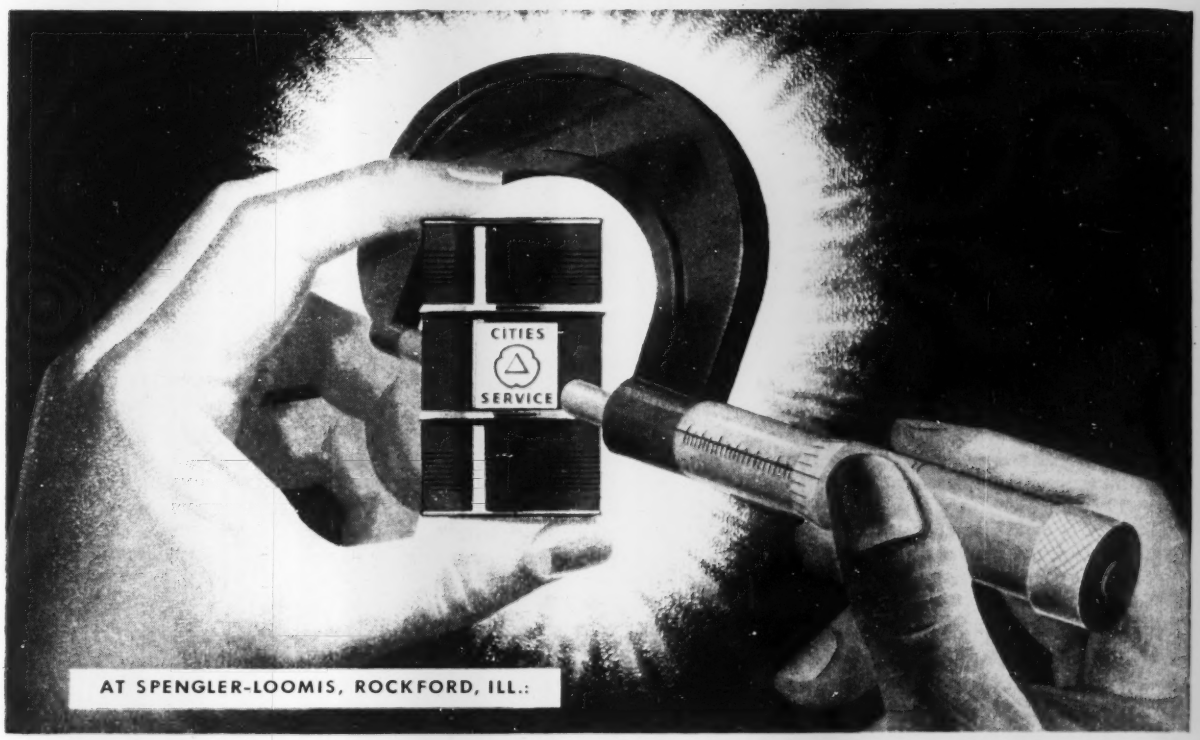
Eddy Current and Related Subjects

Chairman—H. N. Staats, Magnaflux Corp.
Co-chairman—Cecil Farrow, Republic Steel Corp.
Monitors—Charles W. Briggs, Steel Founders' Society; James W. Dutli, Los Alamos Scientific Laboratory.

Electronic Thickness Gage for Measuring the Thickness of Metallic Coatings—Abner Brenner, Chief, electrodeposition section, National Bureau of Standards (to be delivered by Jean Garcia-Rivera).

Nondestructive Testing by Eddy Current Methods—Richard Hochschild, physicist, Hanford Operations Office, USAEC.

Practical Nondestructive Testing with Conductivity—William A. Cannon Jr., engineer, Magnaflux Corp.



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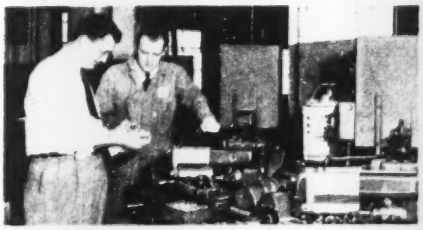

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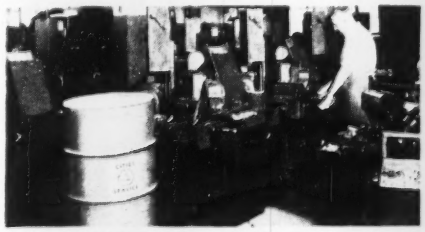

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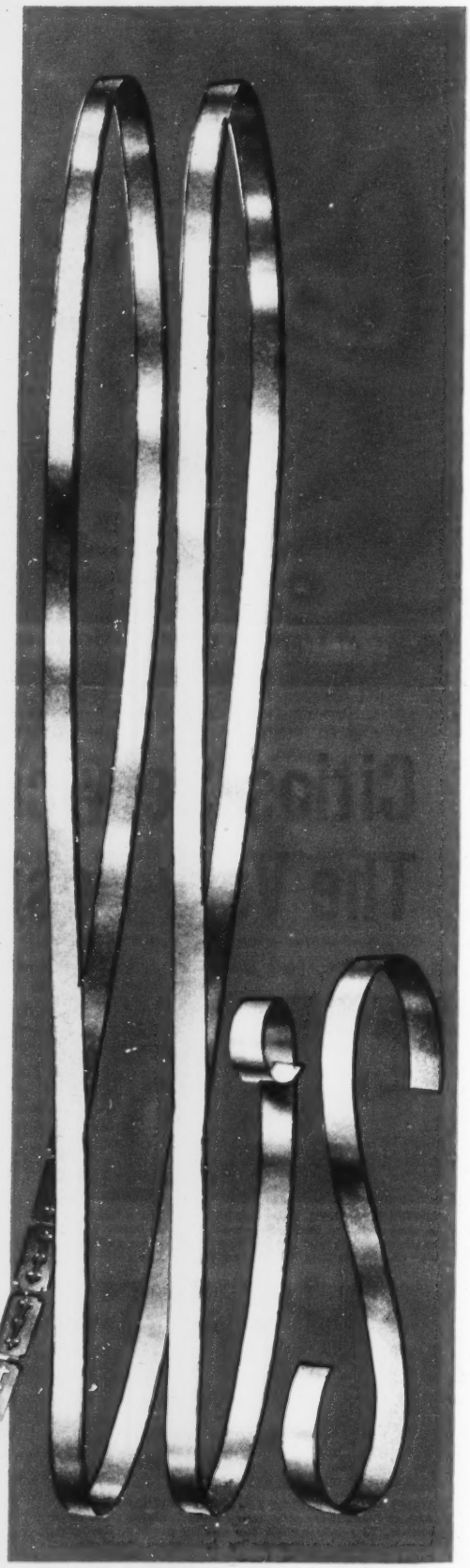

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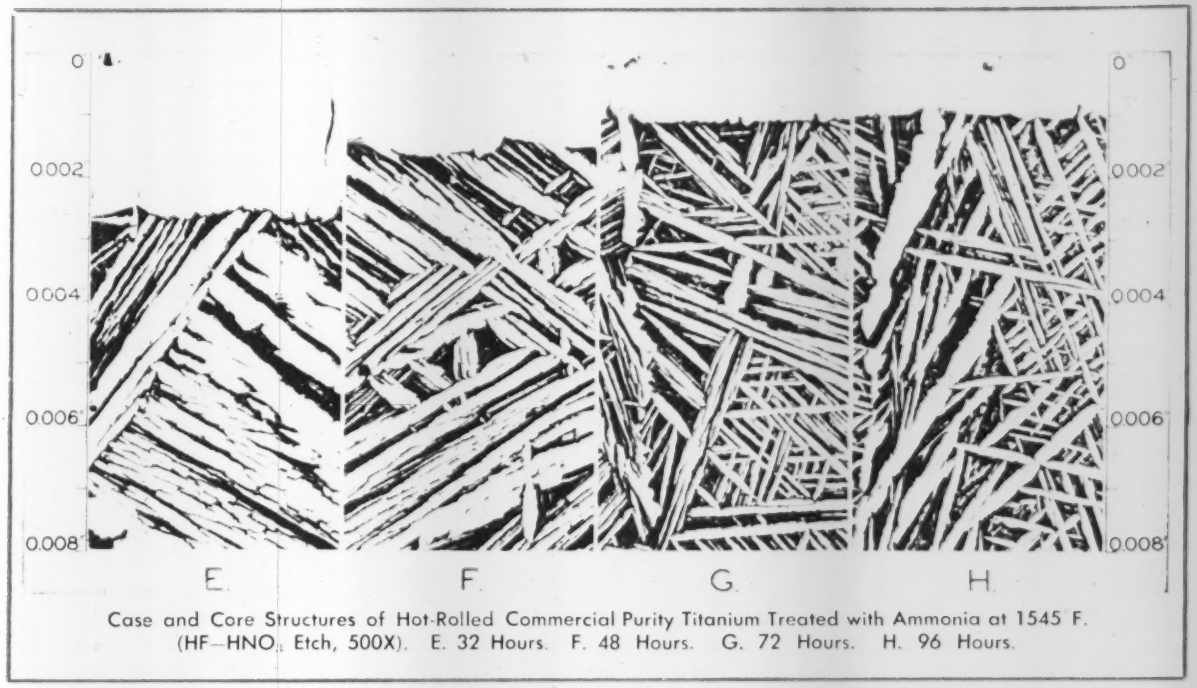

Case and Core Structures of Hot-Rolled Commercial Purity Titanium Treated with Ammonia at 1545 F. (HF—HNO_3 Etch, 500X). E. 32 Hours. F. 48 Hours. G. 72 Hours. H. 96 Hours.

Prevue of ASM Technical Papers

Informative program covers such subjects as titanium, molybdenum, boron, stainless and high-speed steels, nonferrous metals, tempering and physical metallurgy

TECHNICAL men planning to attend ASM sessions at the 35th National Metal Exposition can look forward to a timely and diversified program.

Papers to be presented fall into these general categories: 1. Titanium and molybdenum; 2. Titanium; 3. Mechanical; 4. Nonferrous; 5. Physical metallurgy; 6. Boron; 7. Tempering; 8. Constitution; 9. Stainless and high-speed steel.

Schedule lists sessions running from Monday, Oct. 19, to Friday, Oct. 23. All morning meetings will convene at 9:30 while afternoon sessions will start at 2. Final group of papers will be read on the Friday morning program. Statler hotel and the public auditorium will be the meeting places.

Titanium and Molybdenum—At the opening morning session on Monday, A. D. Kirshenbaum, R. A. Mossman and A. V. Grosse' paper on the determination of oxygen in titanium and zirconium by the isotopic method will be read. Using O^{18} as a tracer, authors report quantitative separation or recovery of oxygen is not necessary. Oxygen values for titanium and zirconium were obtained in the 0.3 to 26 per cent range.

Other papers at this session will cover vacuum-fusion analysis of molybdenum, nitriding of titanium with ammonia and heat treatment of high-strength, titanium-base alloys.

Titanium—Research on a series of Ti-Al-Mo alloys with aluminum contents to 6 per cent and molybdenum contents to 10 per cent will be discussed in a paper by H. D. Kessler and M. Hansen at the Monday afternoon meeting. Among their conclusions: Results indicate 4 per cent or more aluminum does not greatly improve strength and markedly reduces ductility at moderate temperatures. Heat treating response of the alloys is chiefly a function of molybdenum content.

Other topics scheduled for the session include transformation kinetics and mechanical properties of Ti-Al-Cr alloys, correlation between heat treatment, microstructure and mechanical properties of Ti-Mo alloys and isothermal transformation of Ti-Mn alloys.

Mechanical—These meetings will be held on Tuesday and Friday mornings. Among the Tuesday papers, J. T. Ransom will describe the effect of inclusions on the fatigue strength of SAE 4340 steels. In forgings made from two commercial heats, he found that fatigue cracks initiated at elongated, nonmetallic inclusions, both in bending fatigue specimens taken transverse to the forging direction and in torsion fatigue specimens taken in any direction in the forgings.

Strain aging behavior of rheo-

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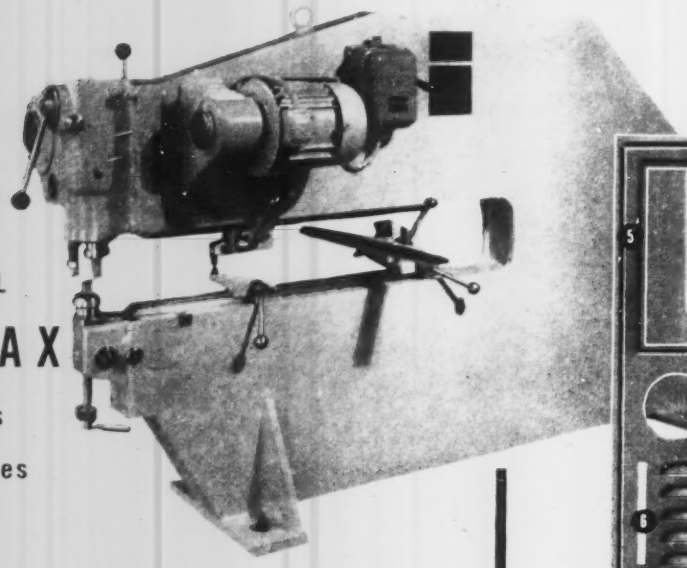

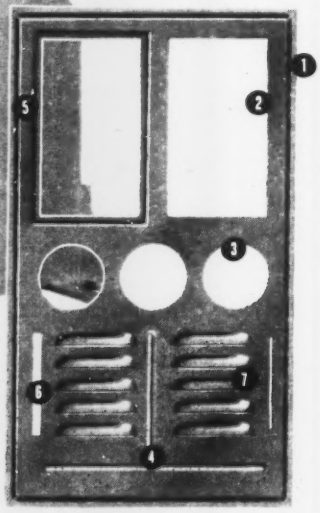

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tropically embrittled steel will be explained by E. J. Ripling at the Friday session. He reports rheotropic recovery produced in a steel heat treated to a high hardness level persists through a second tempering (or aging) treatment up to temperatures at least as high as the initial tempering temperature.

Nonferrous—Behavior of hydrogen in zirconium, as reported by C. M. Schwartz and M. W. Mallett, will be one of three papers given on this subject Tuesday morning. Authors conclude "second phase" in nominally pure zirconium is hydride ZrH. Microscopical examination reveals phase varies directly with hydrogen content. Amount of phase is reduced by vacuum annealing.

In a paper concerning recrystallization to control mechanical properties of molybdenum, one of the conclusions is that an increase in grain size from 1700 grains per square millimeter to 100 grains per square millimeter raises ductile-to-brittle transition temperature about 212°F.

Complete phase diagram of the system Zr-Al is discussed in the third paper. Nine intermediate phases are noted: Zr_3Al (8.9 per cent Al); Zr_2Al (12.88 per cent Al); Zr_5Al_3 (15.07 per cent Al); Zr_3Al_2 (16.46 per cent Al); Zr_4Al_3 (18.15 per cent Al); ZrAl (22.82 per cent Al); Zr_2Al_3 (tentative, 30.72 per cent Al); $ZrAl_2$ (37.16 per cent Al) and $ZrAl_3$ (47 per cent Al).

Physical Metallurgy—Session on Tuesday afternoon will include papers on the effect of pearlite spacing on transition temperature of steel at four carbon levels, elevation of critical temperatures in steel by high heating rates and super cooling and dendritic freezing in alloys.

W. C. Winegard and B. Chalmers, authors of the paper on supercooling and dendritic freezing, propose that dendrites in ingot structure are produced as a result of constitutional supercooling, and that the dendritic equiaxed zone in the center of ingots is the result of nucleation in a large, constitutionally-supercooled region.

Boron—Following a paper involving the behavior of metal under dynamic loading in the morning, the Wednesday afternoon meeting will cover the boron hardenability mechanism, effect of boron on notch toughness and temper embrittlement, study of the Fe-Fe_2B system and carbonitriding boron steels.

Concerning carbonitriding, G. W. Powell, M. B. Bever and C. F. Floe set out several conclusions. Among them: Hardenability of AISI94B17 and 80B20, carbonitrided at 1600° F, is lower than that of the same steels carburized at 1700°F. They say this may be explained by interference of nitrogen with the action of carbon.

Another point proposed is that hardenability of carbonitrided cases of AISI94B17 and 80B20 is lower than that of carbonitrided cases of AISI 1020. Authors say this difference is probably due to the precipitation in the former of alloy nitrides that nucleate the pearlitic reaction.

Tempering—Three possible ways of eliminating embrittlement of alloy steel at high strength levels will be suggested by L. J. Klingler, W. J. Barnett, R. P. Frohmberg and A. R. Troiano at one of the two Thursday morning meetings.

Authors outline these approaches: 1. Development of special analyses with retarded martensite tempering characteristics. 2. Development of faster tempering steels so that overaging will occur and 3. Development of steels in which high strength bainite can be produced.

In another paper, Walter S. Owen will describe the effect of silicon on the kinetics of tempering. Among his conclusions: In the presence of silicon, much higher tempering temperatures are necessary before any appreciable third-stage decomposition can be detected. Carbon diffusion, he reports, controls the kinetics of the second and third stages in plain carbon steels, but when the silicon content is sufficient, this control is no longer operative in the third stage. Reaction is controlled by diffusion of silicon away from the interface.

Constitution — Second morning session on Thursday will be devoted to these topics: Equilibrium structures in Fe-Cr-Mo alloys, survey of vanadium binary systems and gamma loop studies in the iron-vanadium and iron-vanadium-titanium systems.

Summary of 21 vanadium binary systems by W. Rostoker and A. Yamamoto will include terminal solubility limits, identities of intermediate phases and reactions between intermediate phases and terminal solid solutions. Information was obtained through review of the literature and experimental studies on more than 150 alloys prepared by arc melting. One of their conclusions: Vanadium appears to enjoy wide solid solubility limits for a large number of alloy additions.

Stainless, High Speed Steel—On Thursday afternoon, papers will be concerned with high temperature transformations in ferritic stainless steels containing 17 to 25 per cent chromium, intergranular corrosion of ferritic stainless steels, grain growth in high speed steel and discontinuous grain growth in high speed steel.

Eric Jula and Morris Cohen report that the well-known, fish-scale fracture in high speed steel is a phenomenon of discontinuous grain growth that occurs during the reaustenitizing of previously hardened steels.

During the second heating, they state, the proeutectoid carbides dissolve by the first austenitizing treatment precipitate in a fine dispersion and impede grain growth. However, as the second austenitizing temperature approaches the first, these carbides dissolve and coalesce sufficiently to release some grains while others are still inhibited, thus leading to discontinuous coarsening. In this way, the coarsening temperature and resulting grain size are directly related to prequenching temperature.

Work on intergranular corrosion of ferritic stainless steels was by R. A. Lula, A. J. Lena and G. C. Kiefer. According to them, ferritic stainless steels with 16 to 28 per cent chromium are susceptible to intergranular attack in Krupp solution, 65 per cent boiling nitric acid and nitric-hydrofluoric acid mixtures when rapidly cooled from temperatures above 1700°F.

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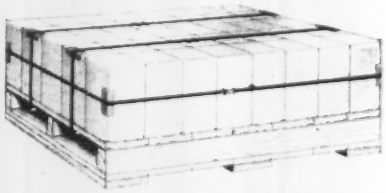

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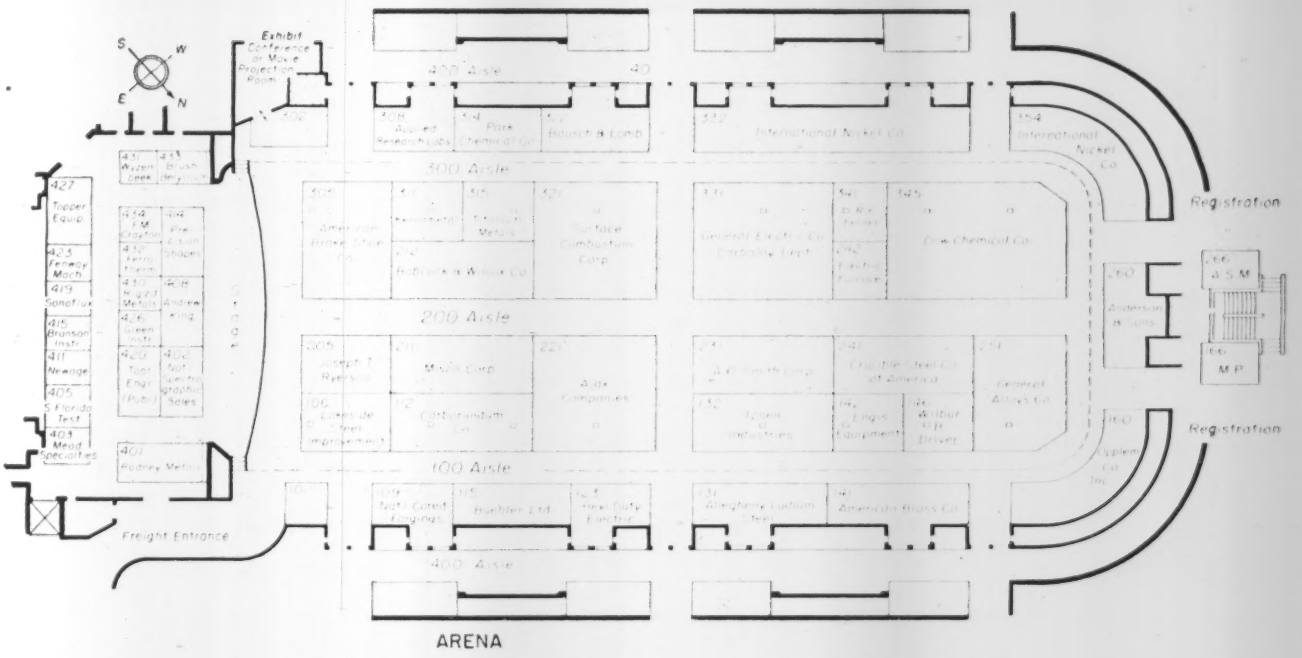


EXHIBITORS

Here are the companies whose products, processes and services you will see at the show. You can note now exhibits that are of particular interest to your field

Ace Drill Bushing Co. Inc., Los Angeles 2619
Drill jig bushings

Acetogen Gas Co., Detroit 1108
Flame cutting tips, adaptors and equipment

Acme Mfg. Co., Ferndale, Mich 1651
Grinding, polishing, buffing and deburring machines, automatic welding positioners

Acme Steel Co., Chicago 2323
Conveyor strapping units, metal stitchers

Acme Tool Co., New York 726
Grinding, polishing, buffing and deburring machines, automatic welding positioners, stoker presses

Adamas Carbide Corp. Harrison, N. J. 2550
Tungsten carbide tools, tool tips, dies, wear parts, stoke presses

Ajax Electric Co. Inc. Philadelphia 221
Salt bath brazing, heat treating

Ajax Electrothermic Corp. Trenton, N. J. 221
Electric induction furnaces for melting, forging, heating

Ajax Engineering Corp. Trenton, N. J. 221
Electric induction melting furnaces

Ajusto Equipment Co. Toledo, O. 2471
Adjustable chairs, stools

Aldridge Industrial Oils Inc. Cleveland 702
Industrial oils

Allegheny Ludlum Steel Corp. Pittsburgh 131
Stainless, tool, electrical steels, carbide products, forgings, cast-to-shape products

Allied Chemical & Dye Corp. New York 2567
Chemicals

Allis Chalmers Mfg. Co. Milwaukee 2621
2o-kw induction heater, small apparatus

Allison Co., Bridgeport, Conn. 2561
Abrasive cut-off machines

Alloy Engineer & Casting Co. Champaign, Ill. 2661
Stainless steel, heat-resistant castings

Alloy Metal Wire Co. Inc. Prospect, Pa. 2723
Small furnace, flexing springs welding material

Alpha Corp. Greenwich, Conn. 2602
Solder and products, rolicast and extruded parts, molybdenum disulphide as lubricant

Alpha Metals Inc. Jersey City, N. J. 643
Solder and products, rolicast and extruded parts, molybdenum disulphide as lubricant

Alvey-Ferguson Co., Cincinnati 2509
Parts washing machines, conveyor systems

American Brake Shoe Co. New York 305
Resistant alloy castings, brass and bronze bearings, castings

American Brass Co. Waterbury, Conn. 141
Formbrite drawing brass, copper and copper alloy welding rods, wire, forgings, sheet, tube, specialty items

American Cast Iron Pipe Co. Birmingham 2233
Iron and steel castings

American Chain & Cable Co. Inc. Bridgeport, Conn. 1716
Testers, castings, cutting machines

American Chemical Paint Co. Ambler, Pa. 1104
Protective coating for aluminum

American Cyanamid Co. New York 2311
Boroscopes, diameters and carburizing salts

American Cystoscope Makers Inc. New York 1730
Boroscopes

American Gas Association New York 2645
Industrial gas applications

American Gas Furnace Co. Elizabethtown, N. J. 2749
Gas furnaces and burners

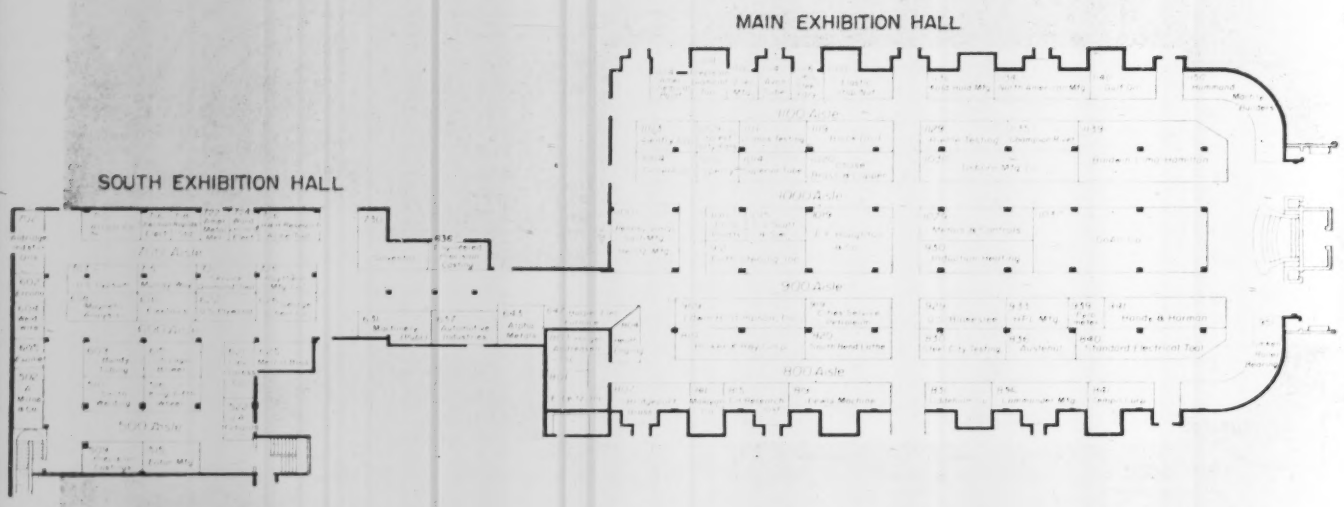
American Manganese Steel Division, American Brake Shoe Co. Chicago Heights, Ill. 305

American Marietta Co. Cleveland 2754

American Metal Market New York 722

American Nickeloid Co. Peru, Ill. 2721
Preplated metals, end products

EXHIBITORS



American Non-Gran Bronze Co.
Berwyn, Pa. 2515
Sheet steel and plate cutting machines, cadet flame cutters

American Optical Co.
Buffalo, N. Y. 1829
Metallograph, metallographic, stereoscopic microscopes, scientific instruments

American Pullmax Co. Inc.
Chicago 2446
Sheet, plate cutting machines

American Radiator & Standard Sanitary Corp., Pittsburgh 1420
Blowers and heating equipment

American Silver Co. Inc.
Flushing, N. Y. 1305
Metal strips, silver solders, precious metals

American Society for Metals
Cleveland 166
Technical books, magazines, educational services

American Society of Tool Engineers
Detroit 420

American Wheelabrator & Equipment Corp., Mishawaka, Ind. 2629
Abrasive blast cleaning machines, shot-peening equipment

Ampco Metal Inc., Milwaukee 2521
Castings, arc and resistance welders, electrodes, hand tools

Amplex Division, Chrysler Corp.
Detroit 2212
Cutite finished machine parts, industrial oil

Anchor Drawn Steel Co.
Latrobe, Pa. 1401

Anderson & Sons Inc.
Westfield, Mass. 260
Photo identification badge equipment

Anderson Oil Co., F. E.
Middletown, Conn. 2034
Metalworking solution

Applied Research Laboratories
Glendale, Calif. 308
Multichannel x-ray quantometer and respectra calculator

Arcair Co., Bremerton, Wash. 710
Torch and electrodes for gouging, cutting all metals

Aronson Machine Co.
Arcade, N. Y. 2135
Welding positioners, turning rolls

Arwood Precision Casting Corp.
Brooklyn, N. Y. 1428
Ferrous and nonferrous precision investment castings

Ashworth Bros. Inc.
Worcester, Mass. 2015
Metal conveyor belts

Atlas Press Co.
Kalamazoo, Mich. 2457
Drill presses, lathes, shapers

Austenal Laboratories Inc.
New York 836
Precision investment castings

Automotive Industries
Philadelphia 637

Avon Tube Division, Higbie Mfg. Co., Rochester, Mich. 1114
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Babcock & Wilcox Co.
Beaver Falls, Pa. 212
Carbon and steel tubing

Baird Associates Inc.
Cambridge, Mass 2012
Spectrometers, densitometers

Baker & Co. Inc.
Newark, N. J. 1842
Industrial and laboratory furnaces, laboratory ware

Baldwin-Lima-Hamilton Corp.
Philadelphia 1139
Powdered metal press, testing machines, strain gages

Barber-Colman Co.
Rockford, Ill. 2473
Capacilogs

Basco Mfg. Co., Stamford, Conn. 2338
Magnetic sheet steel separators

Bath Co., Cyril, Cleveland 1603
Forming sheet metal

Bausch & Lomb Optical Co.
Rochester, N. Y. 322
Photomicrographic cameras, microscope, other metallographic equipment

Bean & Co., Morris
Yellow Springs, O. 2722
Process aluminum castings

Bell & Gossett Co.
Morton Grove, Ill. 1204
Quench oil system, heat exchangers

Beryllium Corp. of America
Reading, Pa. 1735
Beryllium, beryllium alloys

Black Drill Co., Cleveland 1119
Drilling equipment

Blakeslee & Co., G. S.
Cicero, Ill. 929
Metal washers, degreasing machines

Boice-Crane Co., Toledo, O. 2672
Drill presses, band, contour, circular saws, grinder-finisher

Bradley Washfountain Co.
Milwaukee 2408
Group washing equipment

Brainard Steel Division
Warren, O. 2040
Production arm strapping tools and accessories

Branson Instruments Inc.
Stamford, Conn. 415
Instruments

Bridgeport Brass Co.
Bridgeport, Conn. 807
Copper-base alloys, silicon bronze, silicon aluminum bronze alloys, various condensers, heat exchangers, duplex tubes

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Chicago 2016
Printing, developing and drafting machines

Brush Beryllium Co., Cleveland 433
Beryllium metal alloys and compounds

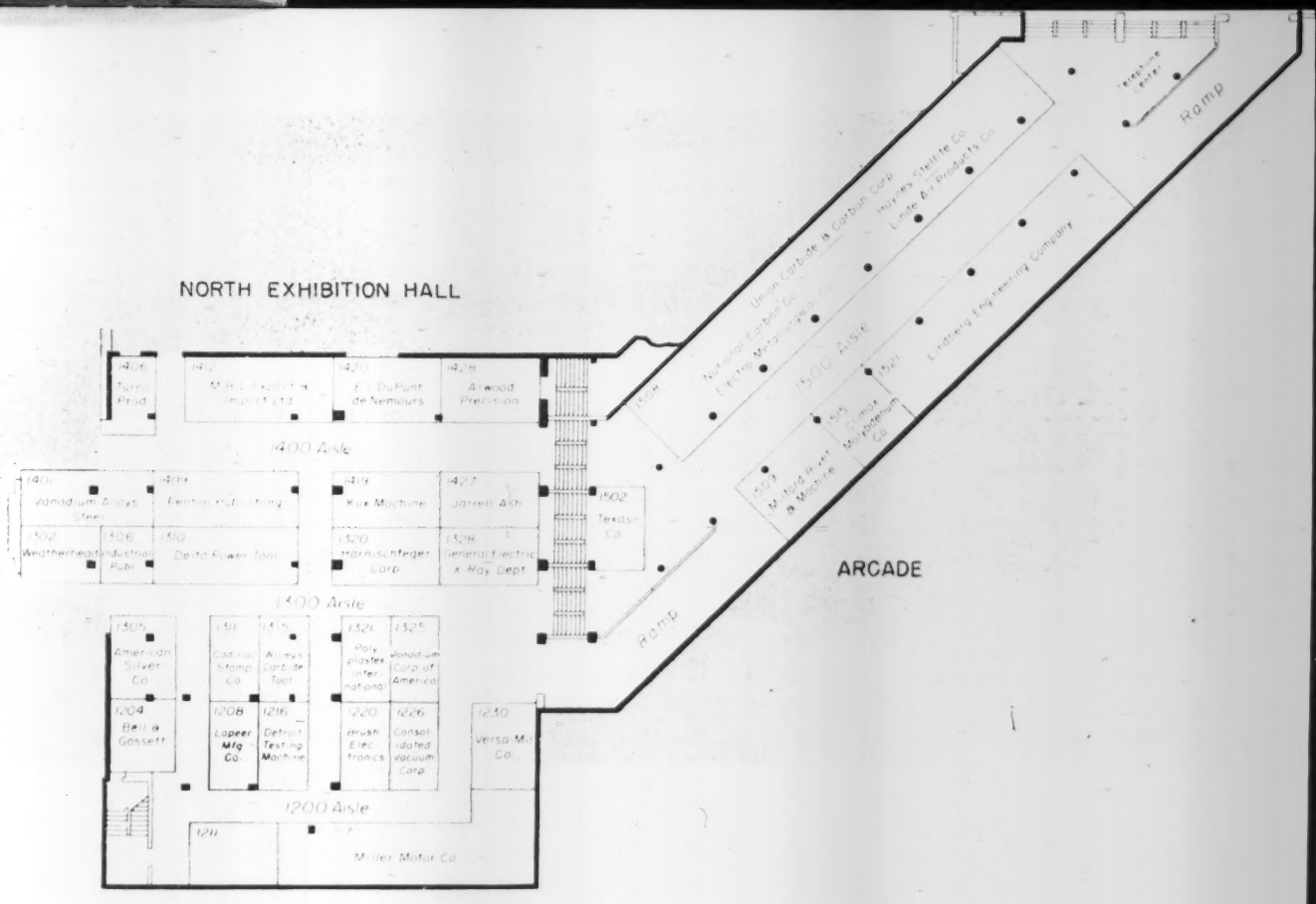
Brush Development Co.
Cleveland 1220
Surface and strain analyzers

Brush Electronics Co.
Cleveland 1220
Industrial and research instruments

Bryant Industrial Products Corp.
New York 2739
Gas Burners

Buck Tool Co.
Kalamazoo, Mich. 2315
Universal scroll, independent chucks

Buehler Ltd., Chicago 115
Laboratory presses, testing machines, metallographs, inspection equipment



Bundy Tubing Co., Detroit 609
Tubing

Cadillac Stamp Co., Detroit 1311
Dies, stamps, badges, marking and numbering machines

Cambridge Wire Cloth Co.
Cambridge, Md. 816
Woven wire belts, industrial wire cloth, gripper slings, heat treating baskets

Cam-Lok Division, Empire Products Inc., Cincinnati 1634
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Carborundum Co.
Niagara Falls, N. Y. 112
Abrasive products, deoxidizers, resistors, heating elements, refractories

Casting Engineers Inc., Chicago 2350
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Challenge Machinery Co.
Grand Haven, Mich. 2202
Welding equipment, precision equipment for tool and machine industries

Champion Rivet Co., Cleveland 1135
Black devil electrodes

Chase Brass & Copper Co.
Waterbury, Conn. 1020
Tellurium copper, telnic bronze and phosnic bronze

Chicago Blower Corp.
Franklin Park, Ill. 615
Airfoil centrifugal fans

Chilton Co., New York 637, 2655

Cincinnati Milling Machine Co.
Cincinnati 1614
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Rahway, N. J. 2774
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Commander Mfg. Co., Chicago 835
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Commercial Filters Corp.
Melrose, Mass. 2665
Filters

Consolidated Vacuum Corp.
Rochester, N. Y. 1226
Metallizing process, furnace with accessories, vacuum pumps

Continental Industrial Engineers
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Industrial furnaces

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Engineering service, testing equipment and special equipment

Cooper Metallurgical Association
Cleveland 2670
Boron and borides

Crane Packing Co., Chicago 2416
Lapping machines, mechanical controls, seals and packings, teflon products

Crayton, F. M., Philadelphia 434
T-slot bolts

Crucible Steel Co. of America
New York 241
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Jamestown, N. Y. 1211
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Grand Haven, Mich. 2453
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Abrasive finishing machines, drill presses, grinders

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Phoenixville, Pa. 2101
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Minneapolis, Minn. 2429
Furnaces

Detrex Corp., Detroit 1807
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Detroit Testing Machine Co.
Detroit 1216
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DeWalt Inc., Lancaster, Pa. 2501
Metal cutting machines, home work shop

Diamond Power Specialty Corp.
Lancaster, O. 1630
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Diversey Corp., Chicago 2008
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Distillation Products Industries
Rochester, N. Y. 1226

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Dow Chemical Co.
Midland, Mich. 345
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Newark, N. J. 116
Cupler and resistance alloys

East Ohio Gas Co., Cleveland 2645

East Shore Machine Products Co.
Euclid, O. 2412
Keyway broaches

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Eclipse Fuel Engineering Co.
Rockford, Ill. 1624
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Union, N. J. 1129
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Electric Furnace Co., Salem, O. 242
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Electro-Alloys Division, American Brake Shoe Co., Elyria, O. 305

Electro-Arc Mfg. Co.
Ann Arbor, Mich. 2464
Disintegrators

Electro Circuits Inc.
Pasadena, Calif. 812
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Electro Metallurgical Co.
New York 1508

Elox Corp., Clawson, Mich. 2660
Electron drills

Engineered Casting Division, American Brake Shoe Co., Rochester, N. Y. 305

Engineered Precision Casting Co.
Matawan, N. J. 636
Investment castings in ferrous and nonferrous metals

Engis Equipment Co., Chicago 142
Diamond abrasive compound, reciprocating and rotary tool, optical tool equipment

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Examples of metal finishing techniques, electroplating equipment

Ercona Corp., New York 602
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Denver 804

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Cleveland 1109
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Gas Machinery Co., Cleveland 2757
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Gas Appliance Service Inc.
Chicago 2753
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General Alloys Co., Boston 251
Castings and furnace mechanisms

General Chemical Division, Allied Chemical & Die Corp.
New York 2567
Chemicals

General Electric Co.
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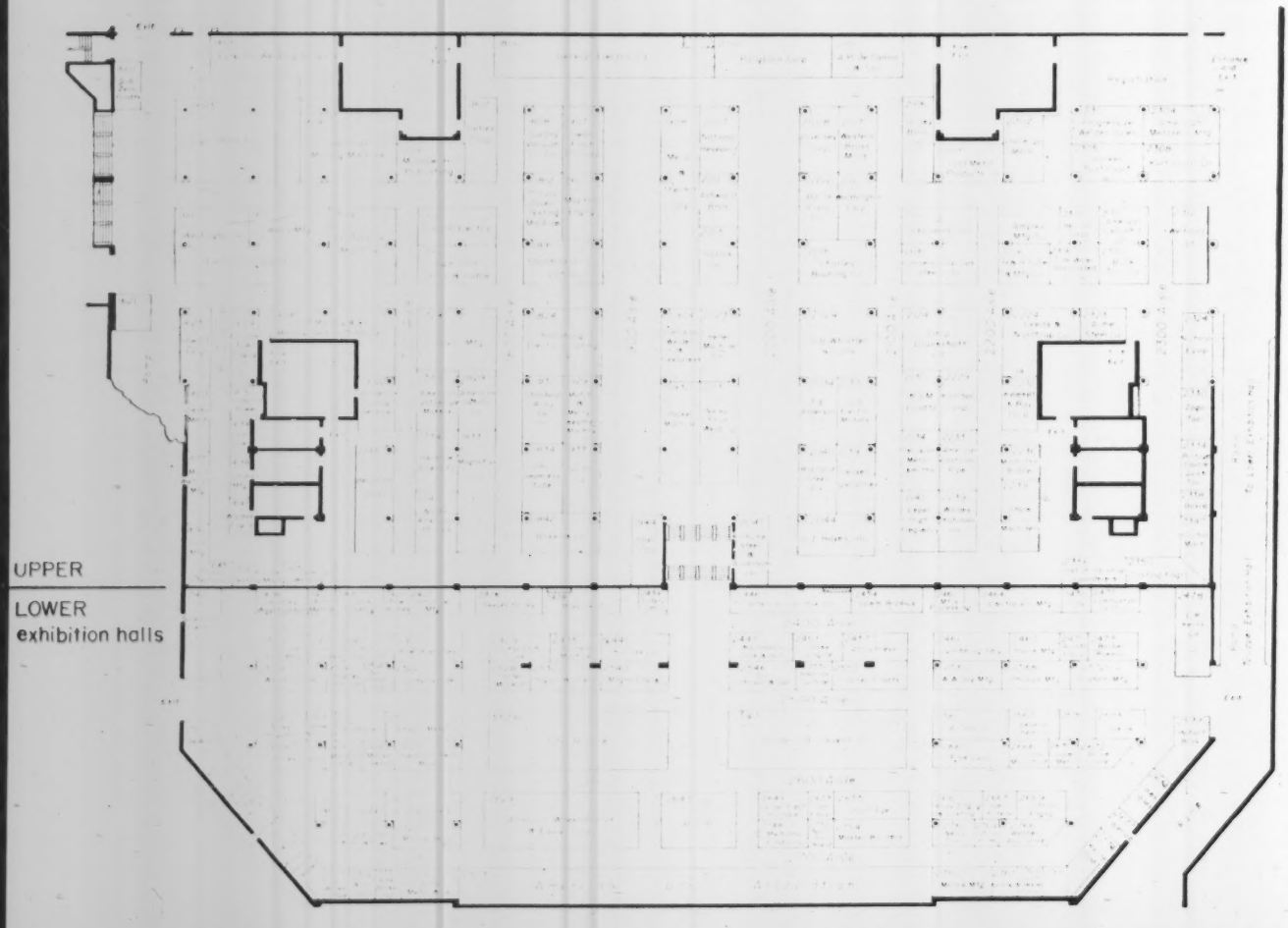
Schenectady, N. Y. 1801
Switchgear, distribution transformer pyrometers, thermocouples and leak detectors, power systems, ultrasonic generator, plant lighting power factor capacitors, welding motors, controls, industrial heating equipment

Carboloy Department
Detroit 331
Carbides

X-ray Department
Milwaukee 1328
X-ray equipment



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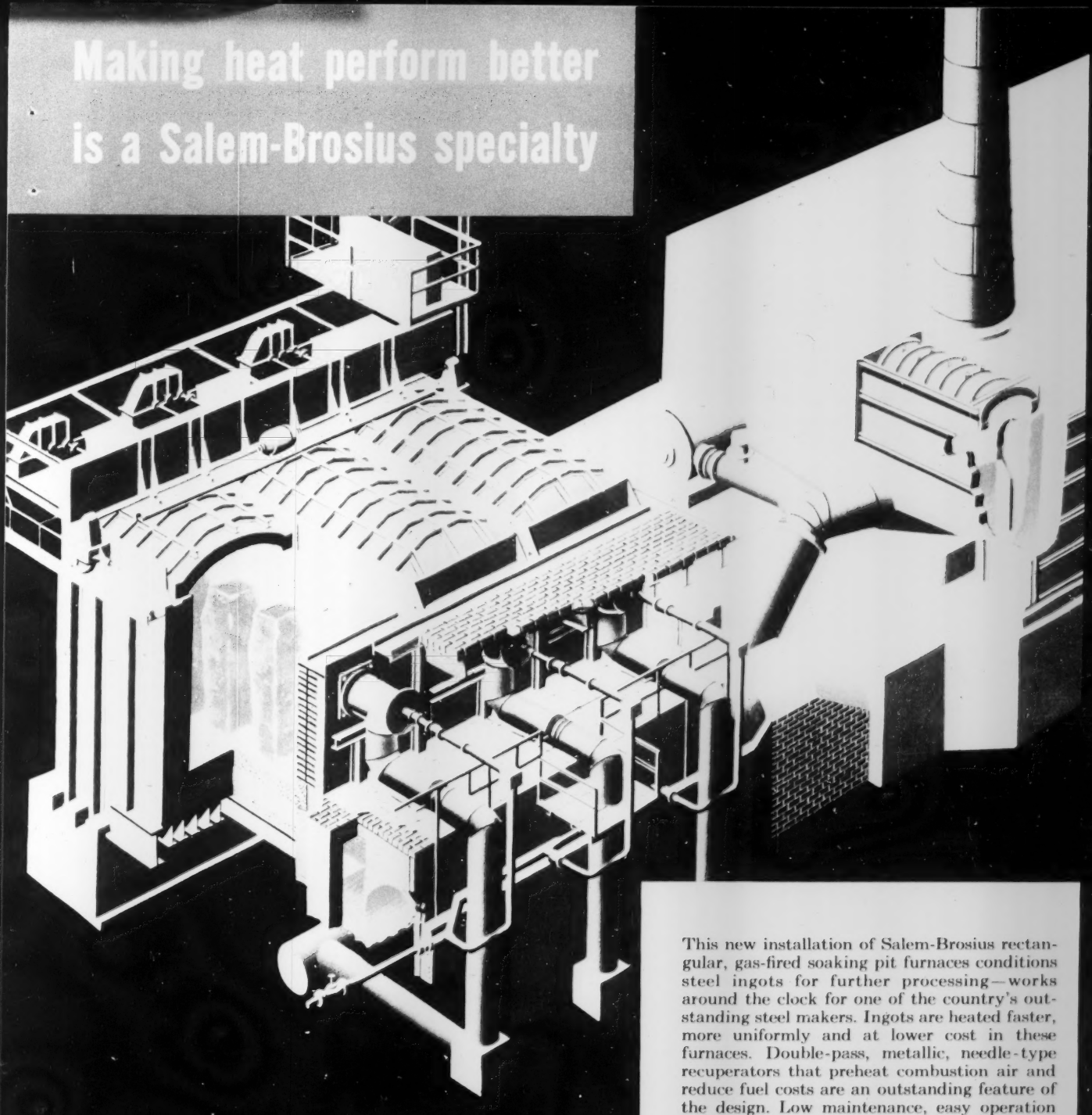

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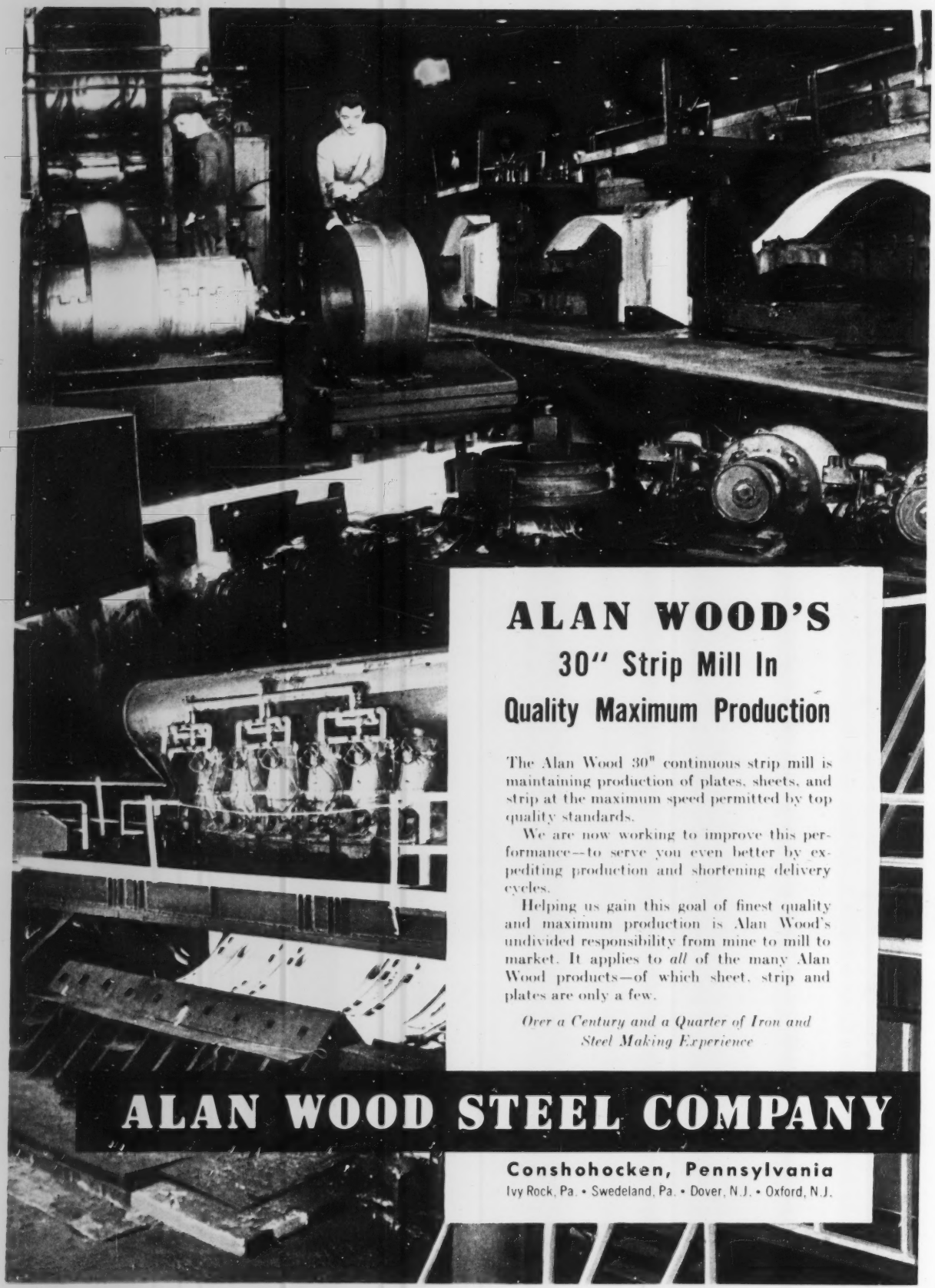

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Industrial Publishing Co. Cleveland 1306

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Keleket X-Ray Corp. Covington, Ky. 2232
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Kemp Mfg. Co., C. M., Baltimore 2735
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Kennametal Inc., Latrobe, Pa. 311
Cemented titanium carbide

Kennecott Copper Corp. Waterbury, Conn. 1020

Kerns Co., L. R., Chicago 2478
Phosphatizer and coatings

King, Andrew, Ardmore, Pa. 408
Brinell hardness testers and microscopes

King Fifth Wheel Co. Philadelphia 516
Welded rings and weldments

Kold-Hold Mfg. Co. Lansing, Mich. 1130

Korhummel Steel & Aluminum Co. Evanston, Ill. 2045
Aluminum, spring steel, steel strip, hot and cold rolled slitting or shearing, tubing, flat wire, phosphor bronze, tin plate

Krouse Testing Machine Inc. Columbus, O. 1647
Testing machines, rotating beam machines and magnifying micrometers

Kux Machine Co., Chicago 1419
Die casting machines, powdered metal press

Laboratory Equipment Corp. St. Joseph, Mich. 2653
Conductometric carbon determinator

Lakeside Machinery Co. Cleveland 2447, 2453, 2457

Lakeside Steel Improvement Co. Cleveland 106
Flame hardening machines and heat treating parts

Lapeer Mfg. Co., Detroit 1208
Clamps, Welding equipment

Lee Co., K. O., Aberdeen, S. D. 2141
Grinders

Leeds & Northrup Co. Philadelphia 2224
Instruments and furnaces

Leitz Inc., E., New York 801
Instruments

Lepel High Frequency Lab. Inc. Woodside, N. Y. 2140
Induction heaters and equipment

Lewis Machine Co., Cleveland 819
Automatic wire straightening and cutting machines

Lincoln Electric Co., Cleveland 1712
Welding equipment

Lindberg Engineering Co. Chicago 1521
Heat treating furnaces and equipment

Linde Air Products Co. New York 1508
Gas welding and cutting equipment

Loftus Engineering Corp. Pittsburgh 2669
Designers, consultants, builders of soaking pits

Los Angeles Dept. of Water and Power, Los Angeles 2716
Industrial advantages of Los Angeles

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Various nondestructive testing methods

Magnetic Analysis Corp. Long Island City, N. Y. 608
Instruments for testing ferrous, nonferrous materials

Malayan Tin Bureau Washington, D. C. 811
New tin alloys

Mall Tool Co., Chicago 2172
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Mallory & Co. Inc., P. R. Indianapolis 1626
Resistance welding equipment

Mallory-Sharon Titanium Corp. Niles, O. 1626

Manco Mfg. Co., Bradley, Ill. 2761
Hydraulic cutters, punches, shears, riveters

Manhattan Rubber Division, Raybestos-Manhattan Inc. Passaic, N. J. 2236
Various types of rubber bonding products

Manufacturers Processing Co.
Ferndale, Mich. 2160
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Marsh Stencil Machine Co.
Belleville, Ill. 2618
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Martindale Electric Co.
Cleveland 2616
Motor and generator equipment

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Industrial building equipment

Maxitrol Co., Detroit 2647
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Chicago 403
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Metal Products Sales Co.
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New York 1908
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Metals & Controls Corp.
Attleboro, Mass. 1029
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Michiana Products Corp.
Michigan City, Ind. 2748
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Melrose Park, Ill. 1217
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Misco Corp., Detroit 211

Misco Precision Casting Co.
Detroit 211

Motch & Merryweather Machinery Co., Cleveland 1929
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Murray-Way Corp.
Birmingham, Mich. 715
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National Cored Forgings Co. Inc.
S. Norwalk, Conn. 109
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National Diamond Laboratory
New York 2752
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National Industrial Publishing Co.
Pittsburgh 2518

National Lead Co., New York 2109

National Research Corp.
Cambridge, Mass. 2007
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Cleveland 402
Spectrographic laboratory

National Torch Tip Co.
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Manchester, Conn. 2760
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Nelson Stud Welding Division, Gregory Industries Inc., Lorain, O. 2031
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Newage International Inc.
New York, N. Y. 411
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New Hermes Engraving Machine Corp., New York 2120
Engraving machines

Nicholas Equipment Co.
Tellevue, O. 2324
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North American Mfg. Co.
Cleveland 1134
Burners and valves

North American Philips Co. Inc.
Mt. Vernon, N. Y. 1740
X-ray diffraction equipment

Norton Co., Worcester, Mass. 1933
Refractory items, abrasive products, grinding wheels

Oakite Products Inc., New York 2573
Solvent that cleans, prevents rust

Officine Galileo, New York 160
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Ohio Crankshaft Co., Cleveland 2124
Induction heating equipment

Ohio Seamless Tube Co.
Shelby, O. 1834
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Ohio Steel Foundry Co.
Springfield, O. 1116
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Willow Grove, Pa. 1812
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Instruments

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Philadelphia 2764
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Osborn Mfg. Co., Cleveland 1030
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Pangborn Corp.
Hagerstown, Md. 2001
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Parker Rust Proof Co., Detroit 2305
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Cleveland 1409

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Indianapolis 1821
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Grand Rapids, Mich. 718
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Rolled Alloys Inc., Detroit 211

Rolock Inc., Fairfield, Conn. 2011
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Salem-Brosius Inc., Pittsburgh 2454
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Schnell Tool & Die Corp.
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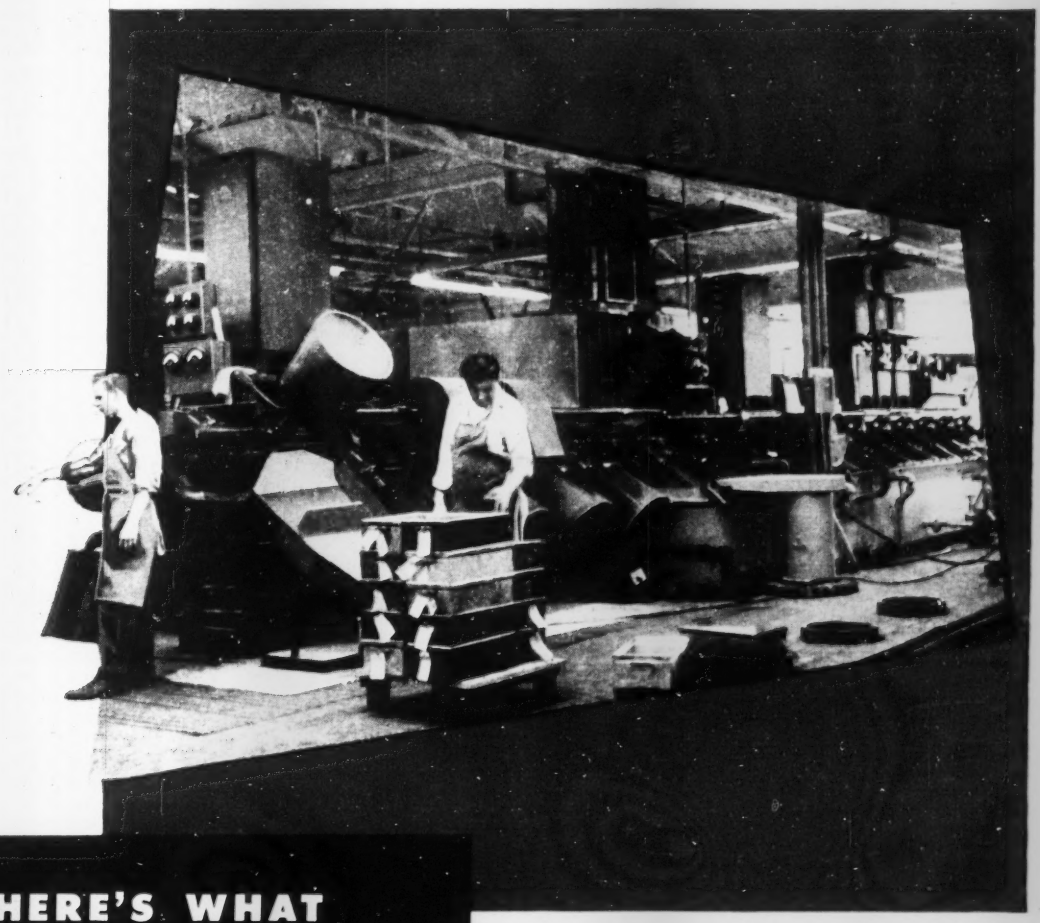

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STEEL Magazine, Cleveland 1409

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Tinnerman Products Inc.
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Detroit 2649
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Cambridge, Mass. 2007

Vanadium-Alloys Steel Co.
Latrobe, Pa. 1401
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Webber Appliance Co. Inc.
Indianapolis 2766
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Weldwire Co. Inc., Philadelphia 604
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Wells Mfg. Co.
Three Rivers, Mich. 1615
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West Instrument Corp., Chicago 2719
Temperature controllers, indicators

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E. Olin, Ill. 2107
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Rockford, Ill. 2473
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Wilson Mechanical Instruments Division, American Chain & Cable Co.,
Bridgeport, Conn. 1716

Worthington Corp.
Dunellen, N. J. 2111
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Yale & Towne Mfg. Co., Powdered Metals Division,
Melrose Park, Ill. 810
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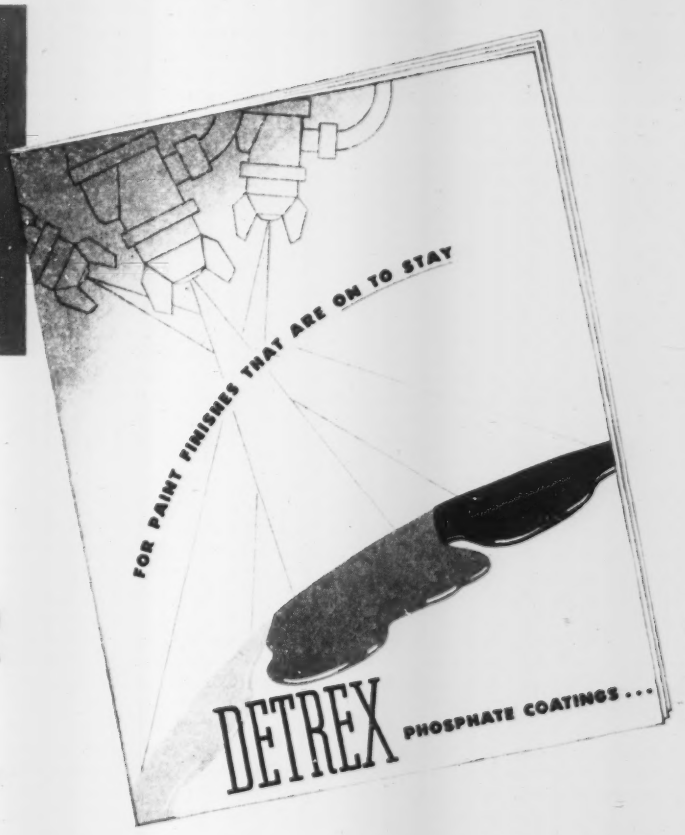
Zagar Tool Inc., Cleveland 2330
Drills and equipment

DETREX PHOSPHATE COATINGS



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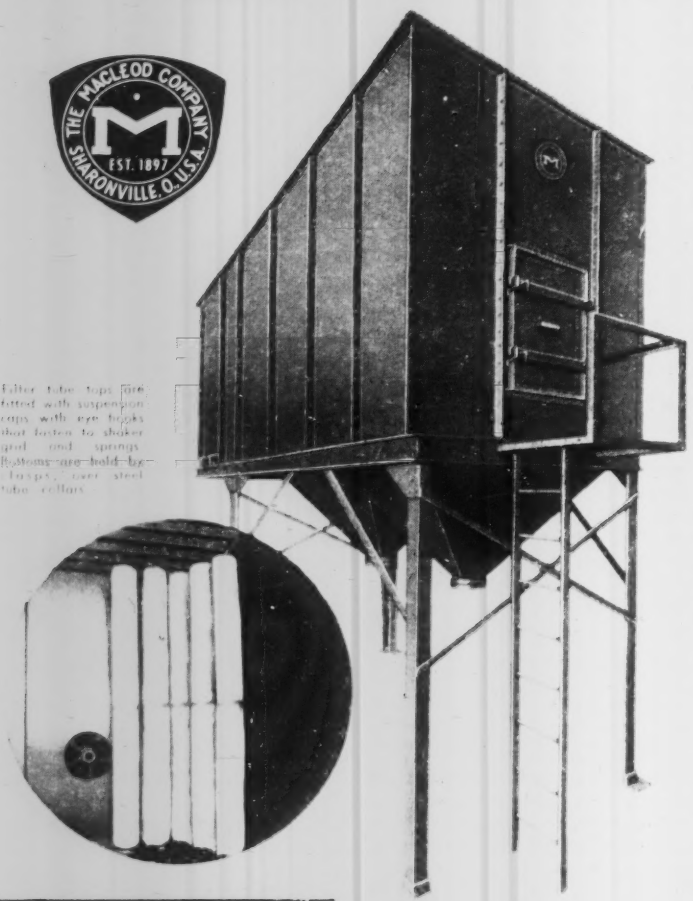

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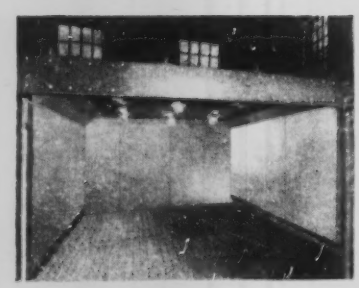

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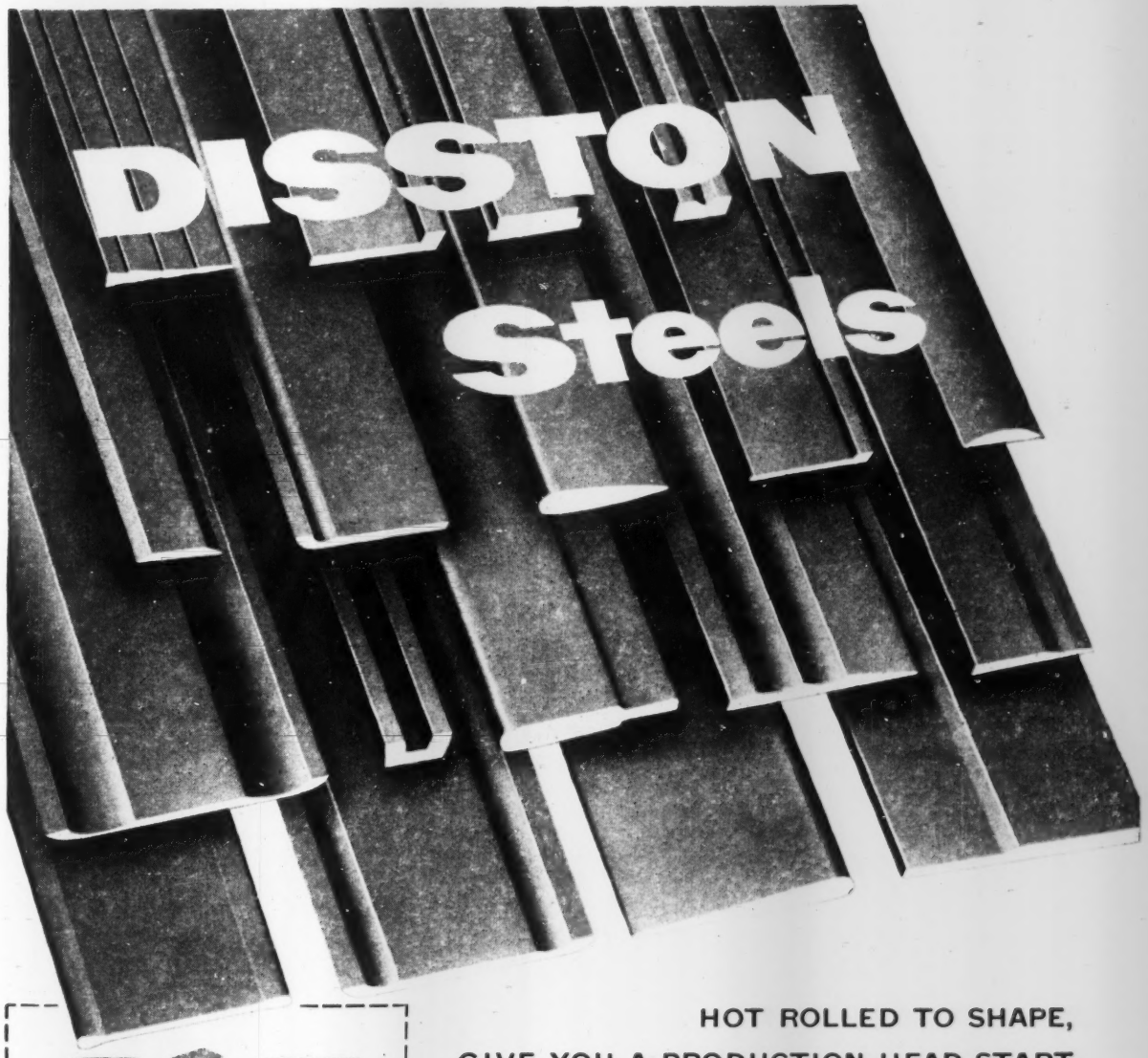

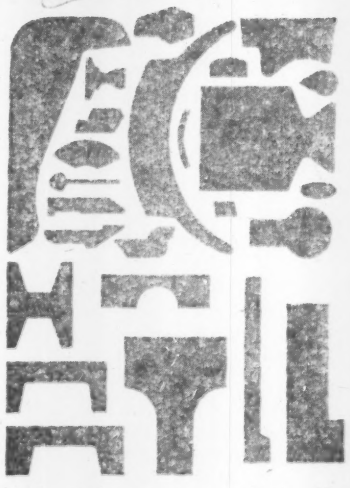

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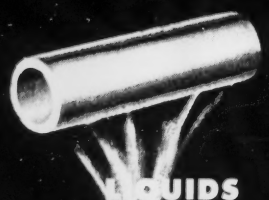

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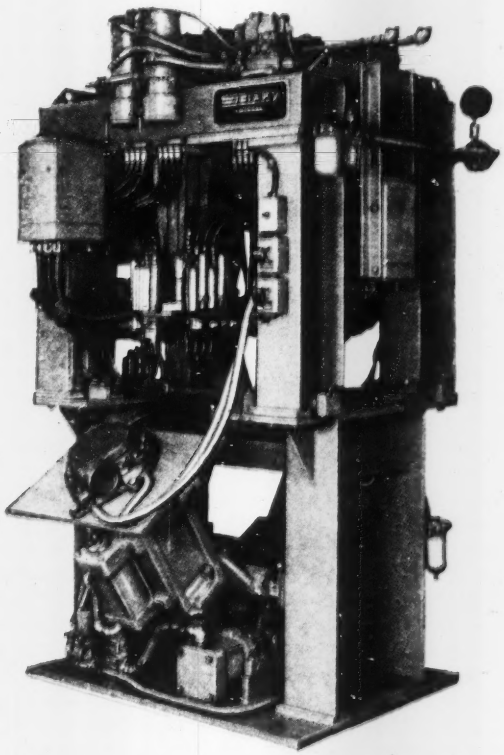

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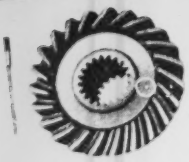

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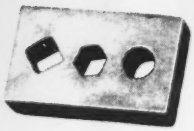

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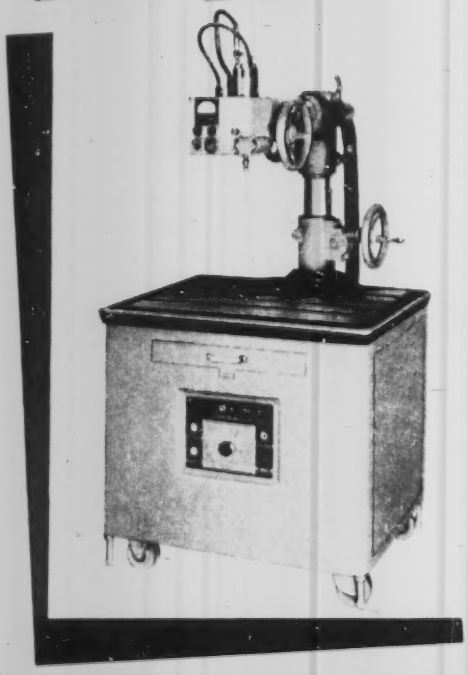

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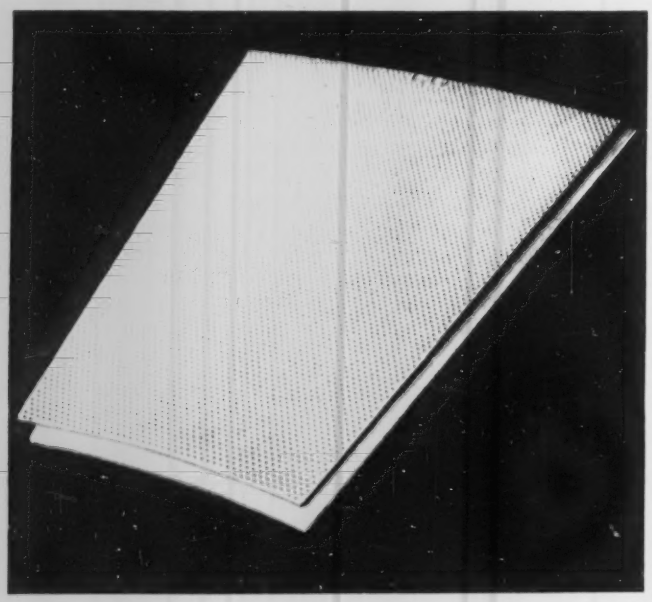
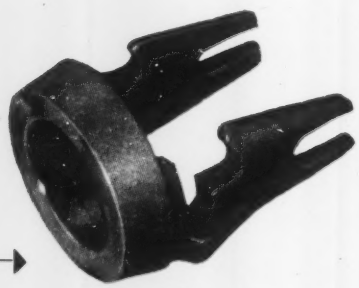
Now They Are Mass Produced

by HAYNES Investment Casting

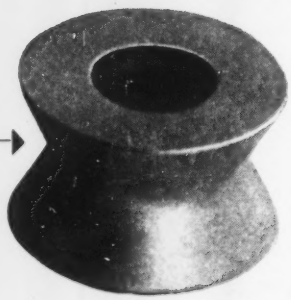
Trade Mark



IMPROVED DESIGN AND MATERIAL—The tiny needle-sharp points covering this plate must resist severe abrasion. Machined points used to wear out frequently because they were pyramidal in shape and highly susceptible to erosion. HAYNES investment casting made it possible to cast the points in a more stable conical shape from a hard, wear-resistant alloy. Life has been increased by 5 to 12 times.



EXCELLENT SURFACE QUALITY—For sanitary reasons, not even the smallest crevice can be tolerated on this cream separator part. Because of the high quality of HAYNES investment castings, it was found that the intricate part could be manufactured on a production basis with a minimum of imperfections showing up during the final polishing operations. This eliminated a great deal of wasted time, work, and metal.



NO MORE MACHINING—HAYNES investment casting eliminated the job of machining these rollers. Service conditions require that the rollers be made of a special alloy which is difficult to machine. They must resist rusting and the cutting action of wire passing over them under tension. The rollers give excellent service life and there are no more machining problems.

HAYNES investment castings can solve some of your own production and design problems. For more information, contact the nearest Haynes Stellite Company office listed below.

"Haynes" is a registered trade mark of Union Carbide and Carbon Corporation.

HAYNES INVESTMENT CASTINGS

Trade Mark

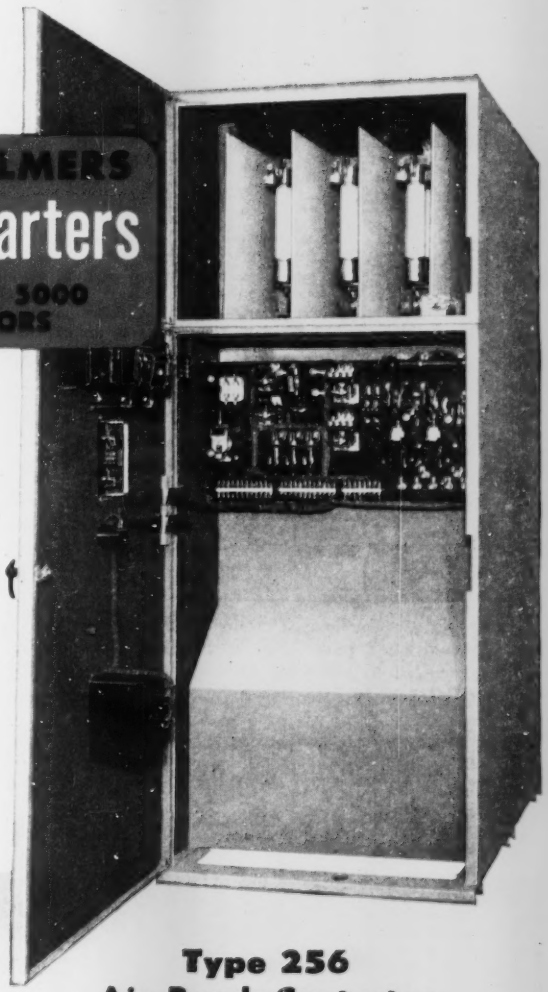
Sound, dense, high-strength parts available in cobalt-base alloys, nickel-base alloys, iron-base alloys, stainless steels, and alloy and carbon steels.

Haynes Stellite Company
A Division of
Union Carbide and Carbon Corporation
UCC
General Offices and Works, Kokomo, Indiana
Sales Offices
Chicago — Cleveland — Detroit — Houston
Los Angeles — New York — San Francisco — Tulsa

When the Going's *Rough!*

Designed and Built for Steel Industry Application

ALLIS-CHALMERS
Type H Starters
FOR 2300 TO 5000 VOLT MOTORS

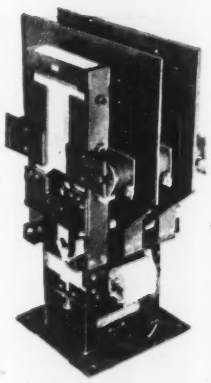


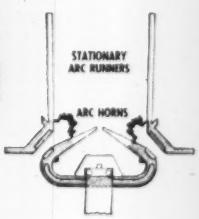
HERE IS A STARTER that is as rugged as the steel industry itself. All the starter's components . . . contactors, meters, overload relays, current limiting fuses, auxiliary switches . . . are engineered and coordinated to meet heavy duty steel mill demands — to provide high capacity interruption and complete protection for man, motor and machine.

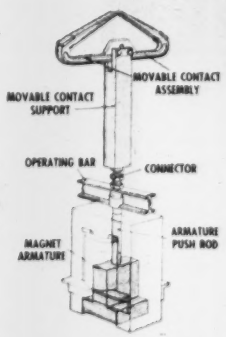
Exemplifying the ruggedness of the Type H starter is the 256 air-break contactor. Frequent starting, inching, reversing or dynamic braking are taken in stride by this dependable performer. Contactor operations can be numbered in the millions with only routine servicing.

In many steel mill applications demanding high repetitive duty, the Type H starter can be used in place of circuit breakers . . . affording substantial savings in initial cost *and* upkeep. Find out how the Type H starter fits into your control picture. Call your nearby A-C representative or write Allis-Chalmers, Milwaukee 1, Wis. Ask for bulletins 14B6410B and 14B7303.

A 4102







Type 256 Air-Break Contactor

Double-break contacts, vertical action and dual blowouts provide long, trouble-free life. No turning shafts, shaft bearings or flexible leads to cause maintenance headaches.

ALLIS-CHALMERS

DO YOU KNOW WHAT HEAT TREATING COSTS

When You Do Your Own?

If you now do your own heat treating—or are contemplating the installation of a heat treating department—have you carefully considered all of the costs involved? Each of the following factors must be given careful consideration:

LABOR

Trained operators require years of experience, without them you cannot expect satisfactory heat treating. Can you afford men of this caliber for the amount of heat treating you require?

MAINTENANCE

Equipment must be kept in constant repair to prevent rapid deterioration. What does it cost you or what will it cost you?

SUPPLIES

Gas, electricity, chemicals—an endless variety of materials are needed continually. Are you wasting money due to insufficient work to keep all equipment going? Closing down and re-heating furnaces is an expensive waste.

TESTING EQUIPMENT

A constant check on heat treating operations and results is required to maintain quality and uniformity. Add this to the cost of your equipment along with skilled operators.

PLANT SPACE

Does your present department have enough space to work efficiently? If planning a new department, will it require an addition to your plant?

INSURANCE

What has the installation of a heat treating department done to your insurance rates? What can you expect if you are planning a new department?

EQUIPMENT

Can you economically install sufficient equipment to handle all of your requirements for hardening, annealing, carburizing, nitriding, etc., or can your present equipment handle all these operations with successful results? Is your capacity flexible enough to handle peak loads?

These are the major items to be figured into the cost of your own heat treating department—there are others which arise in special cases.

The problems listed here have been faced and overcome by commercial heat treaters. They know the answers because heat treating is their business—just as the manufacture of your products consists of solving numerous problems in your business.

There's a Heat Treating Specialist Near Your Plant

Ace Heat Treating Company
Elizabeth, New Jersey
Anderson Steel Treating Co.
Detroit, Michigan
Benedict-Miller, Inc.
Lyndhurst, New Jersey
California-Doran Heat Treating Co.
Los Angeles 23, California
Commercial Metal Treating, Inc.
Bridgeport, Conn.
Commercial Steel Treating Corp.
Detroit 4, Michigan
Cook Heat Treating Co. of Texas
Houston 11, Texas
The Dayton Forging & Heat Treating Co.
Dayton 3, Ohio
The Drever Company
Philadelphia 33, Pennsylvania
Greenman Steel Treating Company
Worcester 5, Massachusetts
Fred Heinzelman & Sons
New York 12, New York
Alfred Heller Heat Treating Co.
New York 7, New York
Hollywood Heat Treating Co.
Los Angeles 38, California
Industrial Steel Treating Co.
Oakland 8, California

MTI
MASTER CRAFTSMEN
METAL TREATING INSTITUTE

L-R Heat Treating Company
Newark, New Jersey
The Lakeside Steel Improvement Co.
Cleveland 14, Ohio
Metal Treating, Inc.
Milwaukee 4, Wisconsin
Metallurgical Control Labs.
Minneapolis 7, Minnesota
Metallurgical, Inc.
Kansas City 8, Missouri
Metlab Company
Philadelphia 18, Pennsylvania

This advertisement sponsored by these Companies which are members of the Metal Treating Institute

Metro Heat Treating Corp.
New York 13, New York
O. T. Muehlemeyer Heat Treating Co.
Rockford, Illinois
Nerl Heat Treating Corp.
South Bend, Indiana
New England Metallurgical Corp.
South Boston 27, Massachusetts
Paulo Products Company
Saint Louis 10, Missouri
Pearson Industrial Steel Treating Co.
Chicago 50, Illinois
Pittsburgh Commercial Heat Treating Co.
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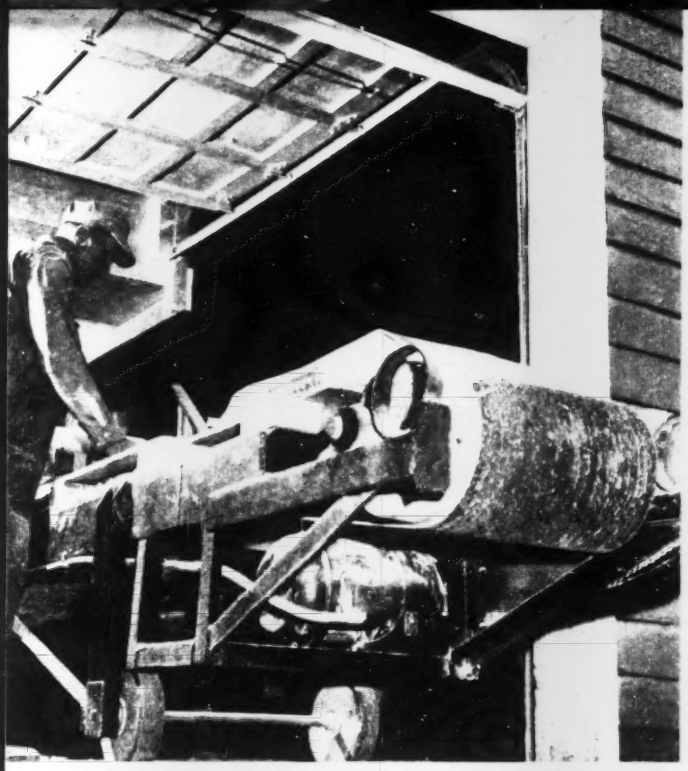
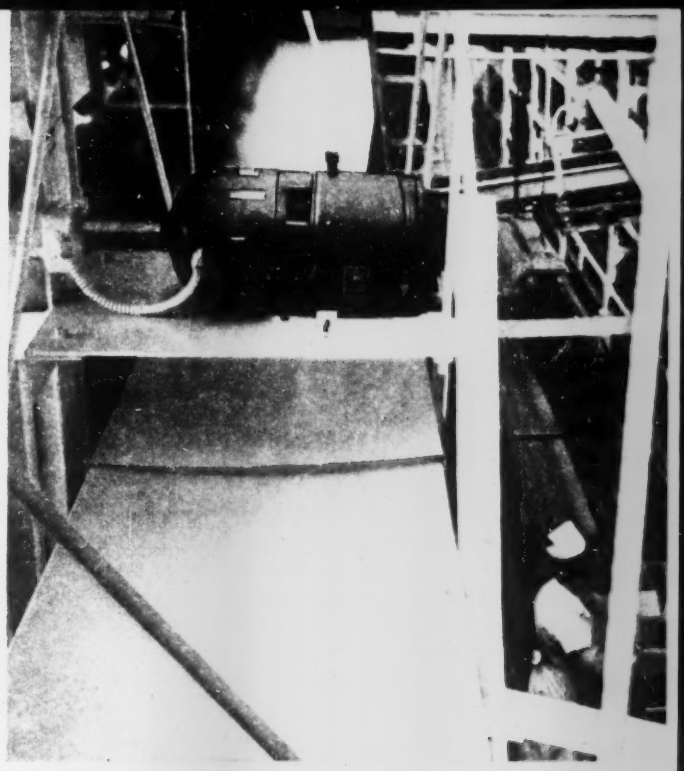
Detroit, Michigan
Winton Heat Treating Company
Cleveland 16, Ohio



ON THE DRIVEN MACHINE. Compact, single-unit G-E Tri-Clad* Gear-motors—available in all three AGMA gear classes—are easily installed on machines such as the conveyor in this chemical plant.



UP OUT OF THE WAY is where this eastern bakery installed a G-E Gear-motor on its cooling conveyor. Gear-motor operates 56 hours per week—no maintenance has been required since installation.

You can install G-E Gear-motors anywhere

. . . on or under the floor, on the ceiling, the wall, or even outdoors in the weather. Installation is no problem with G-E Tri-Clad Gear-motors . . . there are no bulky external couplings, chains, or belts between the motor and the speed-reduction unit. G-E Tri-Clad Gear-motors are packaged, single units . . . complete in themselves . . . as easily and as quickly installed as any constant-speed motor of the same rating.

G-E GEAR-MOTORS SAVE YOU SPACE. Their compact, well-balanced design frees valuable floor space for productive purposes.

G-E GEAR-MOTORS ARE ECONOMICAL. Initial costs are often lower than either a low-speed motor or the combination of a normal speed motor and a separate speed reducer. High efficiency up to 98.5% minimizes operating expenses.

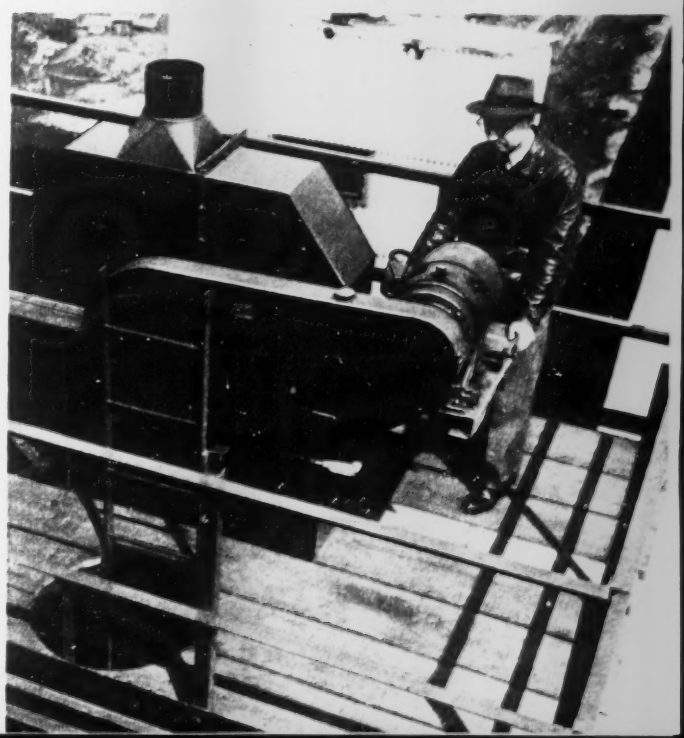
Assure your application of the most compact and economical low-speed drive . . . one which can be installed anywhere. Order your G-E Tri-Clad Gear-motor through your nearest G-E Apparatus Sales Office or your Authorized G-E Agent or Distributor. For more information write to Section 755-13, General Electric Co., Schenectady 5, N. Y. for your free copy of Bulletin GEA-1437H.

*Reg. Trademark of General Electric Company

You can put your confidence in—

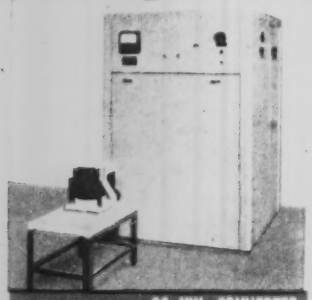
GENERAL ELECTRIC

OUTDOORS IN THE WEATHER. This 5-hp totally enclosed G-E Tri-Clad Gear-motor—exposed to all weather conditions—drives a sand screening operation in a carbon and graphite products plant.



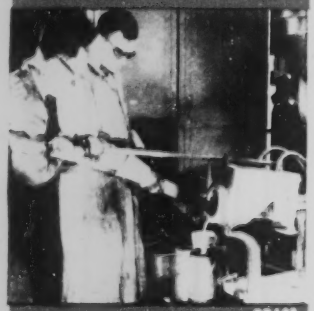
Starting Point For Better Melting

AJAX-NORTHRUP CONVERTER-TYPE FURNACES



20 KW. CONVERTER

STEEL



BRASS

These compact, efficient furnaces are used in all leading metallurgical laboratories, and by the major producers of precision castings.

"Almost every new alloy since 1916 started in an Ajax-Northrup furnace."

The 20 Kw. converter will melt 17 pounds of steel in 40 minutes. Maximum capacity is 30 pounds of steel, or 60 pounds of bronze. The larger 40 Kw. unit melts faster, will handle up to 50 pounds of steel. The 6 Kw. unit melts a pound of steel in 8 minutes.

All units may be used for heat-treating, forging, sintering or other applications—no problem to change from one to the other.

Ajax-Northrup converters are completely self-contained. They can be placed anywhere in your plant where water and power are available, require no special foundation or wiring — and they're certified to meet F.C.C. regulations.

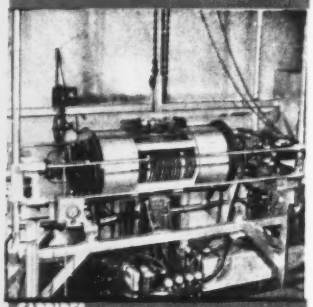
Many of today's "blue chip" industries started with a 20 Kw. Ajax-Northrup converter.

AJAX ELECTROTHERMIC CORPORATION
Ajax Park, Trenton 5, New Jersey

Associated Companies

AJAX ELECTROMETALLURGICAL CORPORATION
AJAX ELECTRIC FURNACE CORPORATION
AJAX ELECTRIC COMPANY, INC.
AJAX ENGINEERING CORPORATION

RESEARCH



CARBIDES

GOLD

AJAX NORTHRUP

INDUCTION HEATING AND MELTING

Since 1916

Here's the NEWEST ADDITION to Worthington's welding positioner line

It's the new, heavy-duty precision welding positioner with the 7 features you've always wanted in one unit

1. PRECISION GEAR AND PINION DRIVE for accurate adjustment and minimum backlash. Self-locking worm reducer provides safety factor in case of power failure. All gears are machine-cut.

2. SPECIALLY-DESIGNED VARIABLE SPEED DRIVE provides stepless speed change from zero to predetermined top speed.

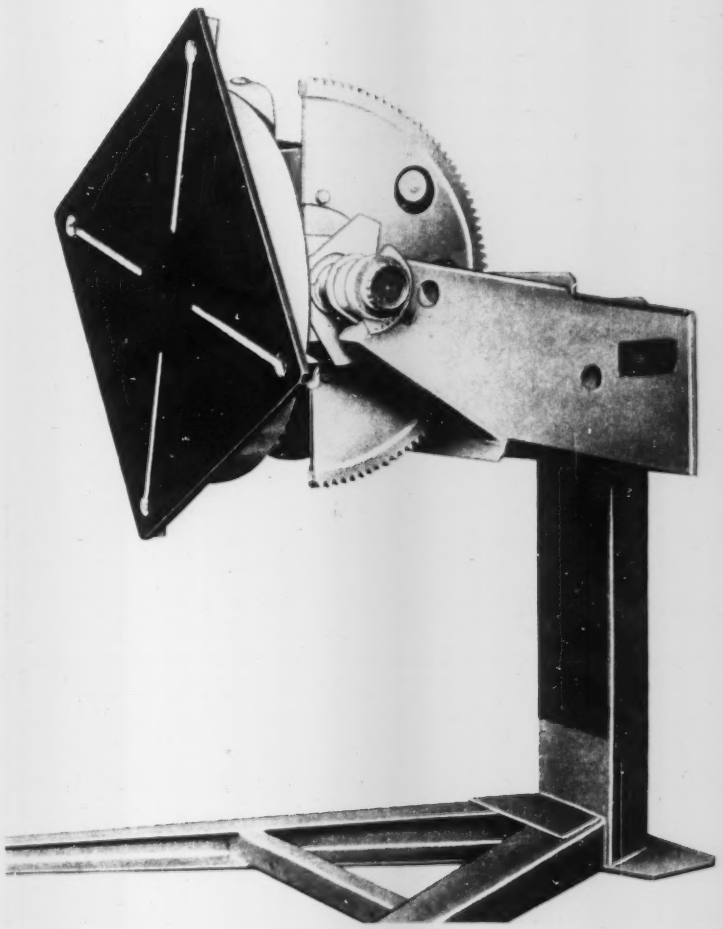
3. FAST-MOVING TILT TABLE with tilt indicator for accurate location of work at the best welding angle.

4. BUILT-IN HIGH-CAPACITY GROUND giving resistance-free return of welding current results in more uniform welds.

5. SPHERICAL SELF-ALIGNING YOKE BEARINGS eliminate misalignment.

6. HEAVY-DUTY FABRICATED STEEL POST, machined on front surface for easier raising and lowering of positioner. Positioner can be mounted on your column or wall by removing standard post.

7. MAGNETIC REVERSING STARTERS and push button controls provide for both rotation and tilt drives.



See these at the National Metal Exposition, 2111 Upper Exhibition Hall, Cleveland Public Auditorium, Cleveland, Ohio.

Y 3 4

The new Worthington positioners come in 2500, 3000, and 6000 lb. capacity sizes. Get more facts by sending the coupon to Worthington Corporation, Section Y.3.4, Plainfield, New Jersey.

WORTHINGTON

WORTHINGTON CORPORATION

Section Y.3.4 **Plainfield, New Jersey**

I'd like to know more about your new welding positioner.

☐ Please send me one of your bulletins.

☐ Have one of your sales engineers call on me.

NAME .....

COMPANY .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....

What kind of wire do YOU want?

You want manufacturers wire to be uniform in grade, strength and analysis . . . free from harmful imperfections . . . meeting specifications exactly. And that's the kind of wire we've been turning out for over a hundred years. Today we can offer you over 400 different types of American Manufacturers Wire, of every size, shape, finish, and metallurgical characteristic . . . and of *consistently* high quality. All this helps to simplify your fabrication job.

Here's another way we can help you. Our staff of trained metallurgists and engineers know wire-application problems inside-out. They've assisted thousands of manufacturers in finding the most suitable wire for a specific job . . . in cutting costs and improving products. And these men are at your service, ready to go to work on your problems too.

If you want a type of wire that we don't regularly produce, you can depend on our modern plant facilities to draw a special wire that will fit your needs exactly. Call our nearest sales office for further information.

If you make it of wire... make it of the best!

U·S·S AMERICAN MANUFACTURERS WIRE

AMERICAN MANUFACTURERS WIRE

AMERFINE—*High-quality fine wire.*

AMERSPRING—*music steel spring wire.*

AMERLOY—*alloy heading wire.*

AMERTEMP—*heavy-duty oil-tempered wire.*

AMERHEAD—*uniform heading wire.*

AMERSTITCH—*extra-tough metal stitching wire.*

USS

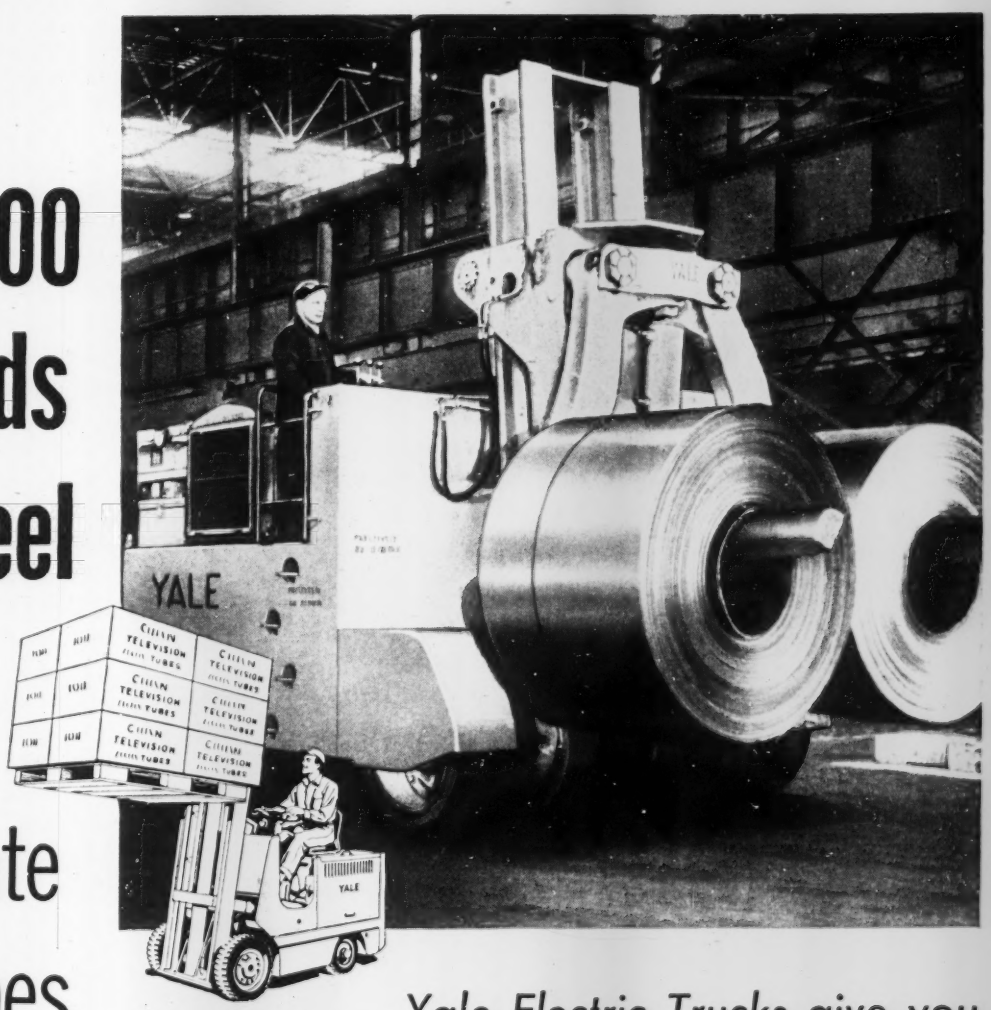
AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL CORPORATION, GENERAL OFFICES: CLEVELAND, OHIO

COLUMBIA GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS

TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL

100,000 pounds of steel or delicate TV tubes . . . . . *Yale Electric Trucks give you the safer way to move more materials*



No matter what your handling problems may be, you can solve them with YALE Electric Trucks. Industries of every kind...companies of every size...are cutting handling costs as much as 75% with YALE equipment and methods... saving time, work and manpower, too. Get one of the wide range of standard models in the capacity you need to become your plant's most versatile tool...or get specialized trucks or attachments for your specialized handling jobs. One or both... a single truck or a fleet...you'll get more maintenance-free, 'round-the-clock service with safer YALE TRUCKS.

MAIL THIS COUPON TODAY

The YALE & TOWNE Manufacturing Co., Dept. 810
Roosevelt Blvd. and Haldeman Ave., Phila. 15, Pa.

Please have your local representative call for an appointment.

Company_____

Name_____ Title_____

Street_____ City_____ State_____

In Canada write: The Yale & Towne Mfg. Co., St. Catharines, Ontario, Canada

YALE* **MATERIALS HANDLING EQUIPMENT**

*Registered Trade Mark

Gas, Electric, Diesel Lift Trucks • *Worksavers* • Hand Trucks • Hand and Electric Hoists • Pul-lifts

Acme Steel Strapping Insures S.A. *(Safe Arrival)*

Increases protection, and speeds packaging rate 100%

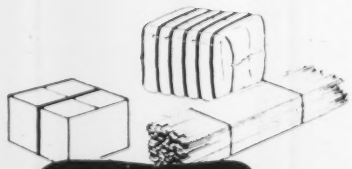
SUCCESSFUL SOLUTION to a difficult packing problem proved to be Acme Steel Strapping, here at the Orangeburg Mfg. Co., Orangeburg, N. Y.

Outstanding feature of sewer pipe made by Orangeburg Mfg. Co. is the material it's made of: fibers, impregnated with coal-tar pitch —non-corrosive, watertight, acid-resistant—but tricky to package.

Three different methods of binding the pipes together were tried without success. The materials either did an unsatisfactory job or proved to be too expensive.

But Acme Steel Strapping did it, doubled the packing rate, doubled the number of pipes per package. It was easy, fast, economical. And it insured Safe Arrival.

This is a typical example of how Acme Steel Strapping helped one manufacturer. Very likely it can help you. Maybe it can solve problems you scarcely know you have—but which cost you money just the same. Write to Acme Steel Products Division, Dept. 103.



ACME STEEL

Acme Steel Products Division **ACME STEEL COMPANY** 2840 Archer Avenue, Chicago 8, Ill.

HOW TO SOLVE HOT SPOTS

(UP TO 2200° F)

in products and processes

If improvement of your product or process depends upon use of extremely high temperature, while minimizing its destructive effects, use Kentanium at the critical points.

WHAT is Kentanium?

A titanium carbide base composition. Uses neither tungsten nor cobalt. Hardness: Up to 93 R A. Weight: ⅔ that of steel.

WHAT can it do?

Resist thermal shock, withstand oxidation and abrasion, retain great strength at high temperatures (1800°F and above).

WHERE is it in use?

Successful applications include: Valves, valve seats, reduction crucibles, anvils for spot welding, hot extrusion die inserts, bushings, flame tubes, balls for hot hardness testing, scarfing tip wear rings, hot flash trimming, hot spinning, and many others.

WHAT forms are made?

Tubes, rods, bars, flats by extrusion process. More complex parts by machining from pressed slugs before sintering; extremely accurate parts by grinding to required tolerance after furnace sintering.

HOW can you use it?

This remarkable new metal, available in many "grades" to meet specific combinations of imposed conditions, can best be adapted to your high temperature problem by cooperative effort. Our engineers will be glad to discuss how you can get best results from Kentanium.

SEE Kentanium demonstration

NATIONAL METAL EXPOSITION
SPACE 311
CLEVELAND — OCTOBER 19-23

KENTANIUM

HEAT-RESISTANT, HIGH-STRENGTH, LIGHTWEIGHT CEMENTED TITANIUM CARBIDE

An Exclusive Development of **KENNAMETAL®** *Inc.*, Latrobe, Pa.

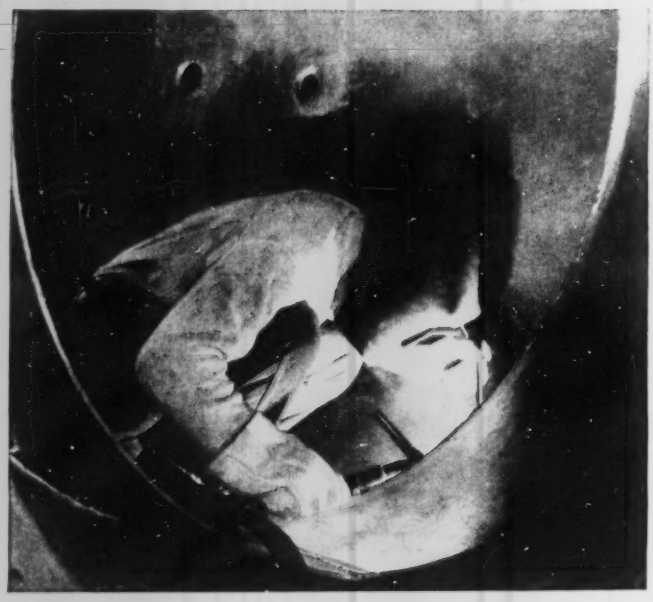
Half mile of HELIARC TRADE MARK welds OK'D by rigid X-ray tests

A midwest manufacturer was faced with the problem of getting X-ray quality welds in aluminum vessels. These welds were subject to pressure and had to be entirely free from porosity and oxide inclusions. After thoroughly investigating customer specifications, LINDE's service engineers recommended HELIARC inert gas shielded welding for the job.

Since then, about a half mile of these HELIARC welds have been OK'd by 100% X-ray inspections. According to company officials, HELIARC welding was "perfect for the job" and meant real savings by getting X-ray quality welds the first time without expensive rejections or repairs.

Whether you weld aluminum or other hard-to-weld metals, you, too, will find that fast, clean, HELIARC welding will save you time and production costs. HELIARC welding takes place under a shield of inert argon gas which eliminates the need for flux. As a result, HELIARC welds are free from porosity and oxide inclusions. This means fewer rejects and lower finishing costs. In fact, spatter-free HELIARC welds in many cases can be left "as welded."

You owe it to yourself and to your Company to find out more about the cost saving benefits of HELIARC welding. Call your local LINDE representative today. He will be glad to furnish you with detailed information on HELIARC welding.



LEFT Welding heavy aluminum sections with HELIARC *HW-10 torch. These welds were strong, dense, and required little finishing. BELOW The 300 amp.* HELIARC *torch has all-internal water-cooling of both torch head and power cable for cool, long-lasting operation. The HW-10 also features quick electrode adjustment.*

Linde TRADE-MARK

LINDE AIR PRODUCTS COMPANY

A Division of Union Carbide and Carbon Corporation

30 E. 42nd St., New York 17, N.Y. UCC Offices in Principal Cities

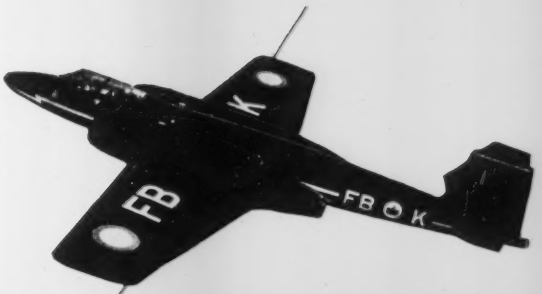
In Canada: DOMINION OXYGEN COMPANY, LIMITED, Toronto

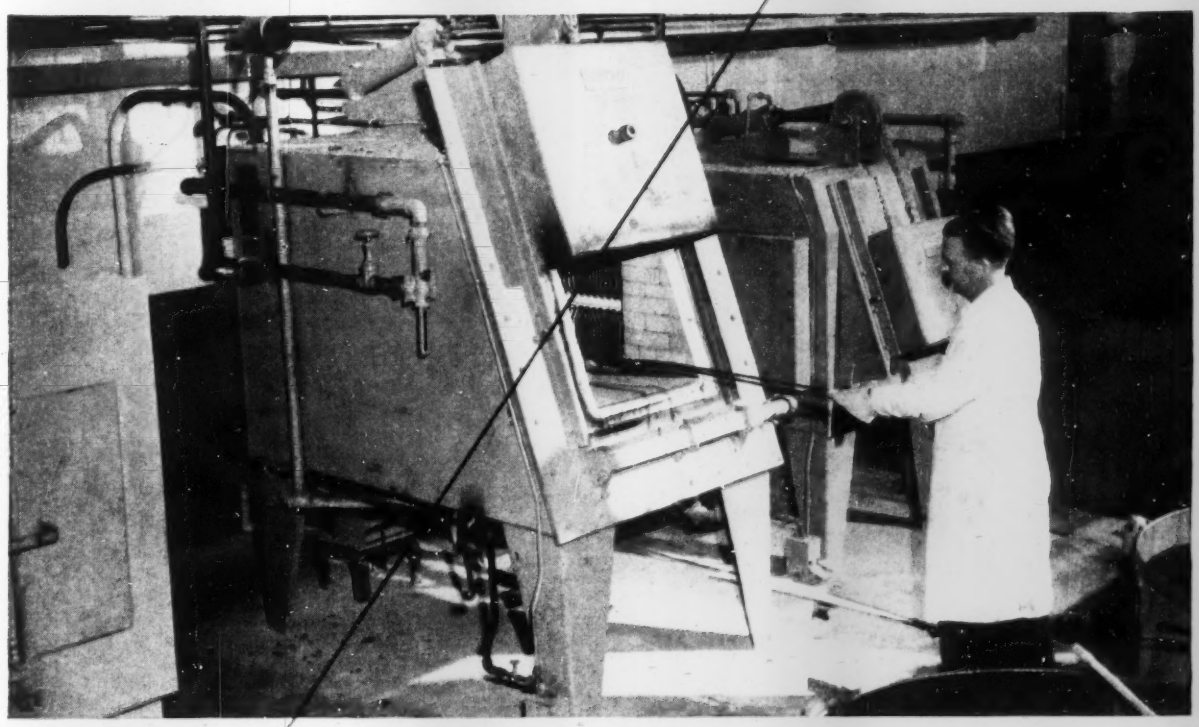
"Heliarc" and "Linde" are registered trade-marks of Union Carbide and Carbon Corporation.

AT A. V. ROE, LTD.—in Canada

LINDBERG FURNACES

HEAT TREAT ORENDA TURBOJET ENGINE PARTS





In Canada, too . . . when production depends on precise heat treating, production men depend on Lindberg Furnaces

Proof of this is the fact that A. V. Roe (Canada) Ltd., in their new multi-million dollar aircraft plant, use Lindberg furnaces to heat treat parts for the world famous Orenda Turbojet engines.

Lindberg toolroom pre-heat and high speed Hydryzing furnaces... plus a toolroom Cyclone tempering furnace harden and temper stub shafts for the Orenda engine.

And a large box type production Hydryzer heat treats ten-stage rotor discs.

Lindberg Furnaces can solve your heat treating problem, too, from the touchiest tool and die job . . . to huge production jobs involving the hardening or tempering of tons of work daily. For descriptive literature contact your nearest Lindberg office.

Bulletin 96*hs* covers the type of furnaces used in the A. V. Roe plant

LINDBERG FURNACES

Lindberg Engineering Company, 2441 West Hubbard Street, Chicago 12, Illinois

new application . . .

Vancoram Grainal

cuts conditioning costs, reduces rejects, steps up production of stainless steels

Stainless steels—particularly the higher alloy grades—are prone to develop cracks and other surface defects during rolling or forging.

Removal of these defects by chipping, scarfing, grinding or trimming means loss of valuable metal and higher unit costs.

A growing number of steelmakers are finding the answer to this problem in Vancoram GRAINAL Alloys, the same multiple-element alloys widely used in the making of boron steels. Field reports indicate that the addition of GRAINAL appreciably improves the steel's hot-working characteristics, resulting in lower conditioning costs and increased production.

Your nearest Vanadium Corporation office will welcome the opportunity to give you additional details on this new application for GRAINAL Alloys.

VANADIUM CORPORATION OF AMERICA

420 Lexington Avenue, New York 17, N. Y.

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Producers of alloys VANCORAM BRAND metals and chemicals

Faster Automatic Polishing, with fewer adjustments, are "Touch of Gold" advantages assured by ALUNDUM abrasive.

Give your polishing the cost-cutting

"TOUCH of GOLD"

...with ALUNDUM* abrasive on your set-up wheels

Here are two big advantages that Norton ALUNDUM abrasive bring to your polishing:

Uniformity Careful processing control of Norton ALUNDUM abrasive assures that grains are uniform in size, structure and chemical composition. No oversize grains to mar surfaces — no flats, slivers or undersized grains that loaf on the job. Instead, you get a full quota of tough, sharp, equal-sized grains that stand up under severest conditions — each one doing its share of fast-cutting, uniform polishing.

High Capillary Action Norton ALUNDUM abrasive is specially treated to raise its capillarity, so that each grain soaks up glue easily and thoroughly. As a result, each grain is held as firmly as its neighbor — giving a strong, long-lasting, top-performing polishing wheel.

In Your Automatic Polishing advantages like the above are particularly important. With each ALUNDUM grain doing an equal share of the work, and each one tightly fixed to the wheel, you can be sure of top-quality polishing with minimum adjusting. That's the product-improving, time-saving "TOUCH OF GOLD" that will build *your* profits on *every* polishing job, from roughing to finishing!

See Your Norton Distributor for quick delivery of ALUNDUM polishing abrasive in the types, sizes, and surface treatments you need. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed in your telephone directory yellow pages under "Grinding Wheels." *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

G-261

NORTON

ABRASIVES

Making better products... to make other products better

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

"How can I get a faster quench?"

"What will step up my production on these grinders?"

"I need 15% more machining speed, with enough cooling"

"What will give me less rejects on these castings?"

"How can I prevent rust on these machined surfaces?"

"I need a drawing lubricant that will reduce press downtime"

Here is where to yell for help!

When you are being pressed because top brass is pushing for lower unit costs—or when you're determined to improve the efficiency of some operation—remember this Houghton Man's ear, and pour your troubles into it.

You'll get help you can *see* go to work—shaving nickels off single operations, chopping folding money from department production.

Here's why we, manufacturers of metal processing compounds, can promise this: Since our beginning we've been more than just suppliers. We have been *researchers*—digging into the whys and hows of such items as heat treating, casting, press forming, machining, cleaning, rust prevention. In each of these we have developed products *plus* the application methods that enable them to do a top job in their field.

We've been doing this for more than 80 years, and from our enormous backlog of experience, the odds are that we can find a cost-cutting answer.

In addition to the Houghton Man's own experience, he has a direct pipeline to the feedbox . . . quick access to all the Houghton information gathered over the years. Phone him now, or remember to see him the next time he is in your plant. You'll be glad you did! E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

Need Money-Saving Production Ideas?

Try Houghton on these:

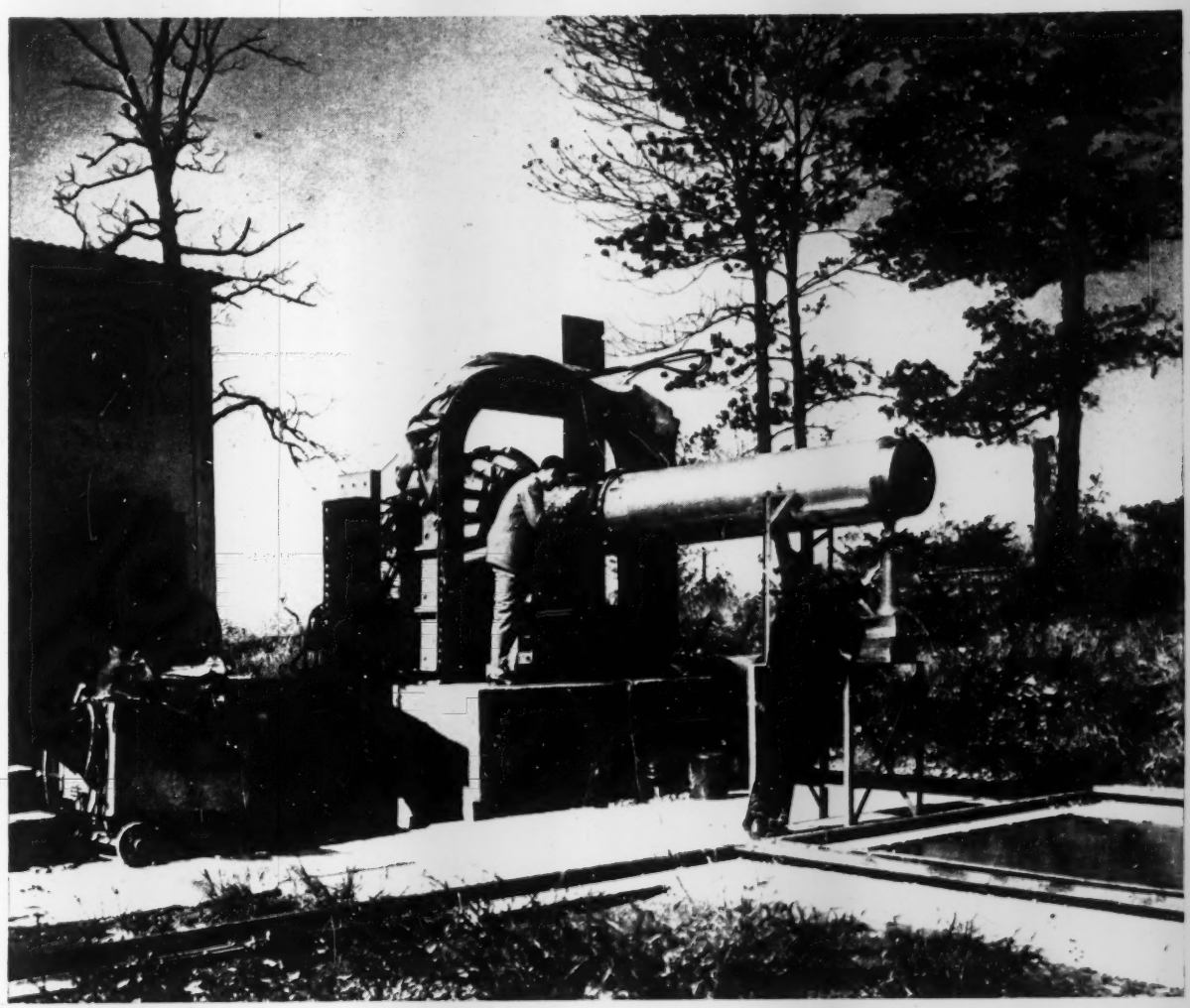
LUBRICANTS
For gears, spindles, hydraulics, moulds, high temperatures and general plant use.

METALWORKING PRODUCTS
Cutting Oils and Bases • Drawing Compounds • Metal Cleaners • Rust Preventives • Foundry Core Binders • Salt Bath Materials • Quenching Oils • Surface Conditioners

HYDRAULIC PACKINGS
and Leather Belting

E. F. HOUGHTON & CO.
PHILADELPHIA • CHICAGO • DETROIT • SAN FRANCISCO

Ready to give you on-the-job service . . .



It's the Test by Fire for High Alloy Steel

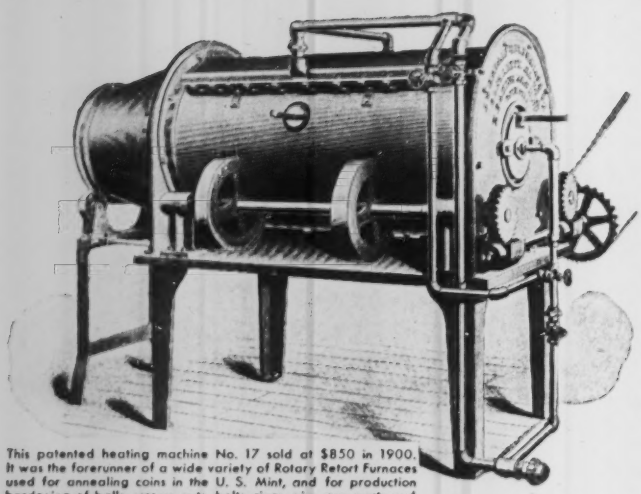
A jet engine on a test stand represents the kind of metal-killing service that no steel could stand until A-L pioneered in suitable high-temperature alloys. Then, *and only then*, came aircraft superchargers, jet and rocket engines, gas turbines, etc. ● You may have a problem of corrosion or heat resistance—of strength with light weight—or of special electrical requirements. The right special alloy steel can solve it, and we're the people to see. ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.***

PIONEERING on the Horizons of Steel

Allegheny Ludlum

AL
LEADING PRODUCER
HIGH ALLOY STEELS

PIONEERS THEN!



This patented heating machine No. 17 sold at $850 in 1900. It was the forerunner of a wide variety of Rotary Retort Furnaces used for annealing coins in the U. S. Mint, and for production hardening of balls, screws, nuts, bolts, rings, pins, gun parts and many other items.

AMERICAN GAS FURNACE CO. 1878 75 years 1953 ELIZABETH NEW JERSEY

At the turn of the century AGF inventors and metallurgists had been developing and building industrial gas furnaces and equipment for twenty-two years.

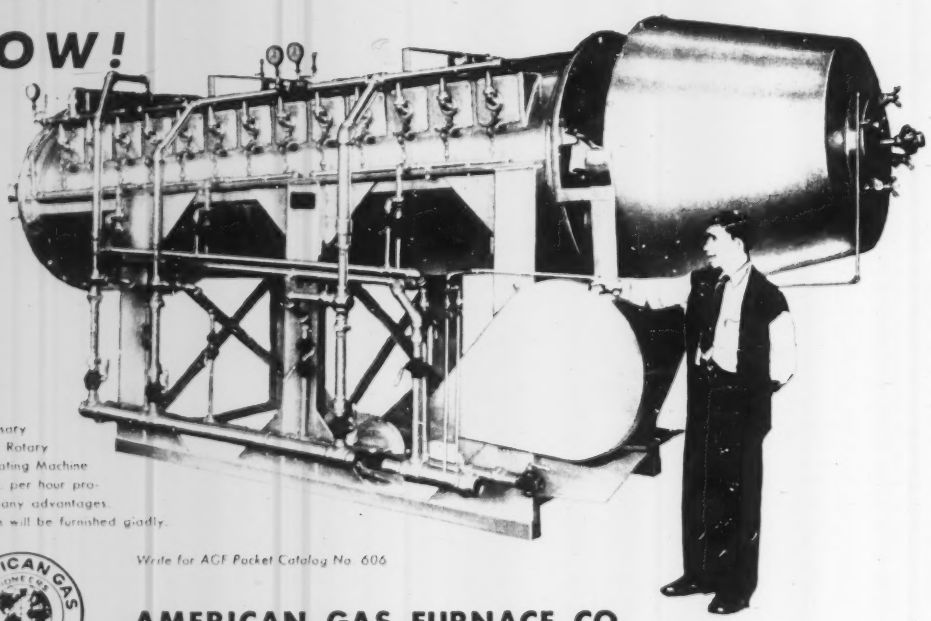
On its 75th Anniversary, American Gas Furnace Co. proudly salutes these other PIONEERS of industry who used AGF Furnaces. To you—our customers—goes the credit for Seventy-five years of AGF Industrial Gas Furnace progress.

SOME AGF FIRSTS!

1st Chain Conveyor Heating Machine 1899
1st Roller Hearth Heating Machine 1899
1st Continuous Rotary Retort Furnace 1902
1st Automatic Temperature Control 1910

1st Vertical Retort Gas Carburizers
1st Rotary Carburizing Furnace
Originated Gas Carburizing
Originated use of Ammonia in Heat Treatment (Nitriding and the Nicarb process)

PIONEERS NOW!

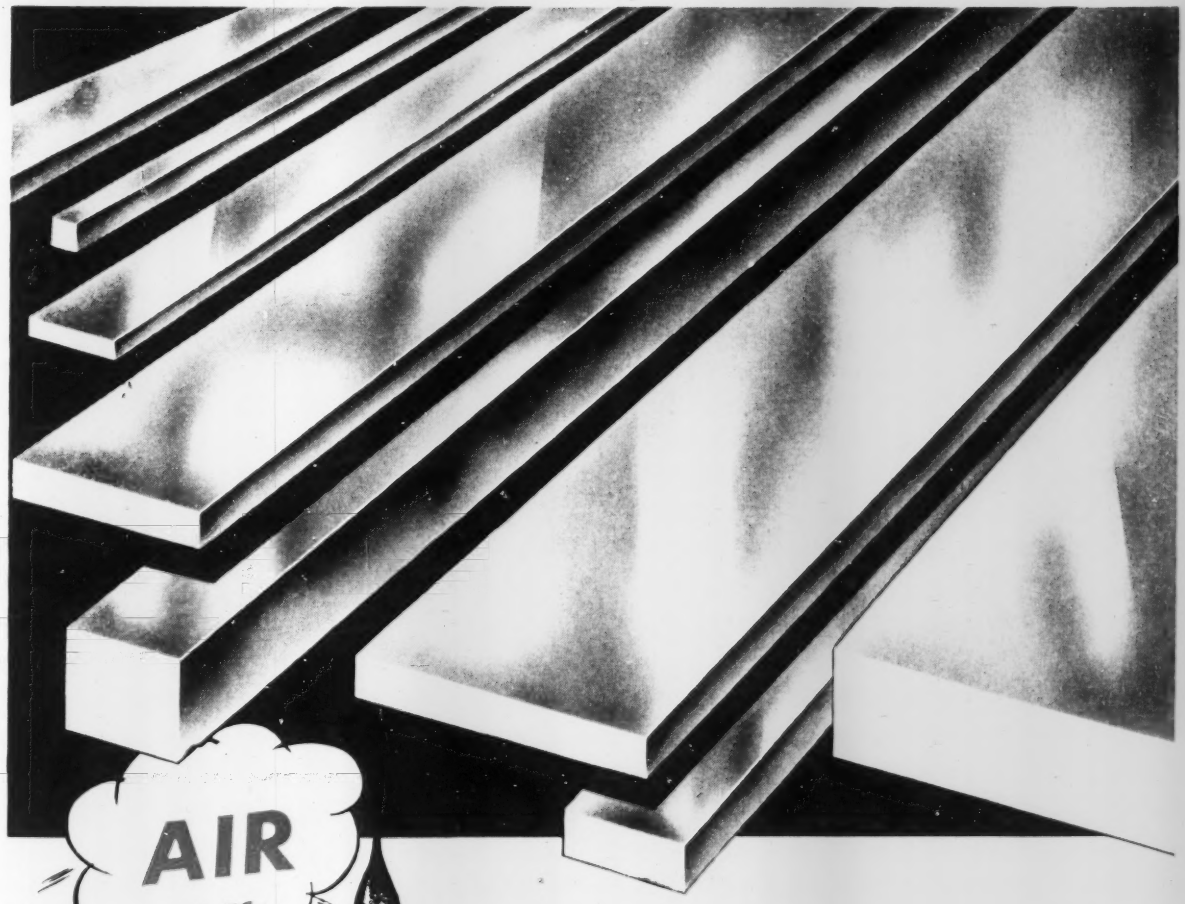


The 75th Anniversary Model No. 139MD Rotary Retort Continuous Heating Machine is a 500 to 1000 lbs. per hour production furnace of many advantages. Complete information will be furnished gladly.

Write for AGF Pocket Catalog No. 606

AMERICAN GAS FURNACE CO. 1878

AMERICAN GAS FURNACE CO.
996 LAFAYETTE ST., ELIZABETH 4, N. J.



AIR or OIL HARDENING?... which DIE STEEL is best for you?

For punches and dies that produce up to 50% more pieces per sharpening — use *Simonds Air Hardening Die Steel.* 5% chrome content makes this non-deforming steel more wear-resistant. Better for punching or cutting silicon or stainless steels, Monel metal, or other abrasive metal. Spheroidize annealed for good machinability, it also has a wide hardening range (1700° to 1800°F). Stock sizes from ½" to 2" thick, and 2" to 10" wide in 36" lengths.

For standard die, jig, punch, gage and small tool applications, *Simonds Oil Hardening Flat Ground Die Steel* is a valuable time and money saver. Made of non-deforming molybdenum type die steel, it is uniformly annealed for easy machining and uniform hardening. Due to its wide hardening range (1450° to 1540°F) good results are assured with even the simplest heat treating equipment. Stock sizes available from 1/64" to 3" thick and ⅛" to 14" wide in 18" lengths. Heavier sizes also furnished in 36" lengths.

Your Simonds Distributor stocks many sizes of both types . . . individually packaged with simple heat treating instructions. Call him for complete details.

SIMONDS SAW AND STEEL CO.

FITCHBURG, MASS.

Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon. Canadian Factory in Montreal, Que.
Simonds Divisions: Simonds Steel Mill, Lockport, N. Y., Simonds Abrasive Co., Phila., Pa. and Arvida, Que., Canada

CONTACT MAN FOR AN ORGANIZATION SERVING YOU

In Los Angeles his name may be Joe, in Cleveland it may be Harvey. Like his "brothers" in principal cities throughout the country, he is *your* key to more helpful information and *complete assistance* in the use of tool, alloy, or stainless steel. He's the fellow on the telephone order desk at your nearest Carpenter MILL-BRANCH WAREHOUSE.

The first time you call him, you'll discover you're getting something *more* than "just steel service". For he is backed by a MILL-BRANCH WAREHOUSE organization. It embraces "trouble-shooting service" right in your own plant. It is backed by trained delivery crews and modern equipment to process orders, fast.

Most important—it is *part and parcel* of the specialty Mill in Reading. Every time you call your Carpenter MILL-BRANCH WAREHOUSE you benefit from Mill Laboratory and Metallurgical Help, Mill Quality Controls—*comprehensive Mill Service.*

Truly, it's almost like having a *specialty* steel Mill right next to your receiving dock!

Whenever you want specific job recommendations or help with a problem, get it by calling Carpenter. Try it and see. Simply pick up your phone and talk to the man on the order desk at your nearest Carpenter MILL-BRANCH WAREHOUSE or Distributor. He'll put you in touch with the person who can help you. The Carpenter Steel Co., 139 W. Bern St., Reading, Pa.

Carpenter

Mill-Branch Warehouse Service

SPECIALTY TOOL • ALLOY and STAINLESS STEELS

Visit the Tycol booth!
Metal Show, Oct. 19-23
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...with TYCOL lubricants on hand!

A Cutting Oil with a "Delicate" Touch! Screw threading to fine tolerances is the acid test of any cutting oil . . . one reason why we ask: can your present oil measure up to Tycol Angrove 40? Take the customer who was threading ⅜" standard threads on 303 Stainless . . . with thread extending to the head . . . and the overall job calling for an extremely fine finish. The best of the competitive oils used yielded only 600 pieces before serration and burring appeared, necessitating regrinding the chaser. Tycol Angrove 40 produced some 4,500 pieces with no defects apparent under magnification . . . and with no regrinding of the chaser throughout the entire run! If you can't top this – contact your local Tide Water Associated office for further information!

Over 300 Tycol industrial lubricants are at your disposal . . . engineered to fit the job!

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KUX

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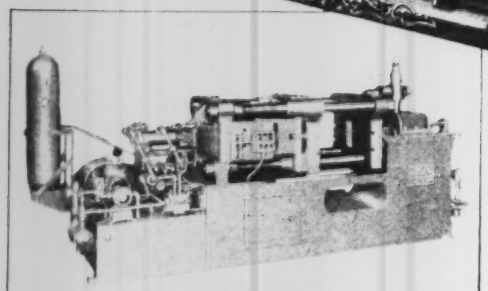
HELPS MAKE HUBLEY
FIRST NAME IN ACTION TOYS



MODEL BH-30
Hydraulically operated die casting machine for production of zinc castings weighing up to 10 pounds.

THE TEXAN

Boys hate to be called, "sissy". To prove they're not, they go to great lengths to be rough and tough. That means their toys, too, have to be rough and tough. Hubley Manufacturing Company, by using KUX die casting machines in the manufacture of its "Texan" Repeater Pistol, gets that extra ruggedness necessary in producing toys that last.

WHAT ABOUT YOUR PRODUCT? Does it stand up to the treatment it has to take? KUX die casting machines can tremendously improve its quality and saleability. Call KUX now! Let us show you how!

KUX MACHINE COMPANY • 6725 N. Ridge, Chicago 26, Illinois

KUX

FIRST NAME IN DIE CASTING MACHINES
SELECTED BY FIRST NAMES IN INDUSTRY

Wire rope? What's that got to do with us?

WICKWIRE ROPE — A C F & I PRODUCT

A lot more than you might think, folks. Consider, for example, the heating in your home . . . the warmth that keeps *her* snug and comfortable through a wintry night. Whether you use coal, oil or gas—wire rope is an indispensable part of the equipment that probes the earth's depths to bring this comfort to you. Chances are, it may be Wickwire Rope. Because for over half a century Wickwire Rope has been an outstanding favorite with men in the mining and petroleum industries. Like users in numerous other lines of business, these men know that for unfailing performance, longer life and more economical service—there's nothing to match the quality and care that go into the making of WICKWIRE ROPE.

A YELLOW TRIANGLE ON THE REEL IDENTIFIES WICKWIRE ROPE

THE COLORADO FUEL AND IRON CORPORATION—Abilene Tex. • Denver
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1792

WICKWIRE ROPE

CF&I PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

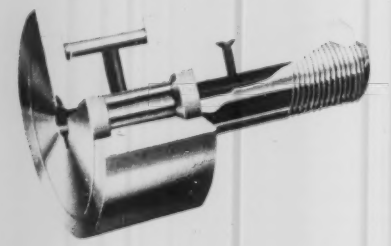
(Advertisement)

CAM ACTION IMPROVED with MULTIROL® BEARINGS

under heavier loads • with shock resistance • and space economy

Modern demands for faster, more automatic machines necessitate a new approach to cam action efficiency. Improvised bolt and roller units are no longer adequate for this mass production machine age.

Machinery manufacturers are finding that even at slow speed, it is difficult to carry the usual heavy radial and intermittent shock loads of cam application efficiently on plain bearings or standard anti-friction ball and roller bearings. With increasing speeds, and lubrication limited by the desire for simplified design, the plain bearing wears excessively and fails early. Ordinary ball or radial roller bearings used on a shaft as cam followers have a



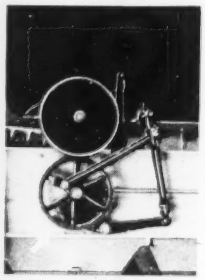
tendency to split in the outer race because of the excessive strain on the thin and superhard race sections.

One bearing that has proven particularly successful in cam follower applications is the Multirol CF series full type roller bearing. This bearing is built especially for the repeated shock loads of typical cam action operations. The outer race section is not only heavy radially but is also martempered to combine maximum toughness with adequate surface hardness for withstanding the punishment of cam applications. The outer ring operates on a full complement of small diameter rollers so the load is evenly distributed over a greater bearing surface. The inner race and flange are made in a single piece with the stud, preventing any possibility of disassembly in operation. Greater accuracy is maintained throughout longer bearing life and, compared with plain bearings, both starting and rolling friction are reduced to a minimum. As a result internal wear is diminished and power requirements of Multirol bearing equipped machines are appreciably lessened.

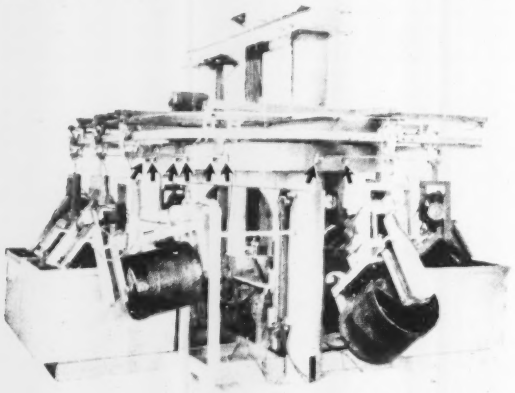
Load Capacity Comparison

To illustrate the increased capacity of the Multirol CF, here is a comparison between a Multirol CF-1 bearing and a corresponding friction type roller, making use of the maximum permissable bearing pressures in pounds per square inch of projected area. The CF-1 bearing will have a maximum of 2240# while the equivalent friction type roller would have a capacity of less than 400#.

What This Means in Terms of Performance

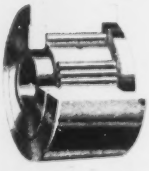


The James Hunter Machine Co., of North Adams, Massachusetts replaced units consisting of a standard roller bearing and hardened roller with Multirol C.' bearings on eccentric cams that actuate rake teeth in their wool washers. The changeover reduced their original and replacement costs over 10% and reduced maintenance to occasional lubrication. Where previously rollers only lasted a maximum of several months, no replacements have been required with the Multirol bearings. As a result, the Multirol Bearings solved a trouble spot that brought in many customer complaints.



Crown Rheostat and Supply Company of Chicago uses up to 200 Multirol Cam Followers as guide and support rollers in the travel and transfer mechanism of their cleaning, plating, and drying machines. Formerly trolleys were suspended from rails but the cam follower units proved to be a more precision means of friction reduction and added stability to the supporting arms.

Other McGILL® Bearings



MULTIROL CYR

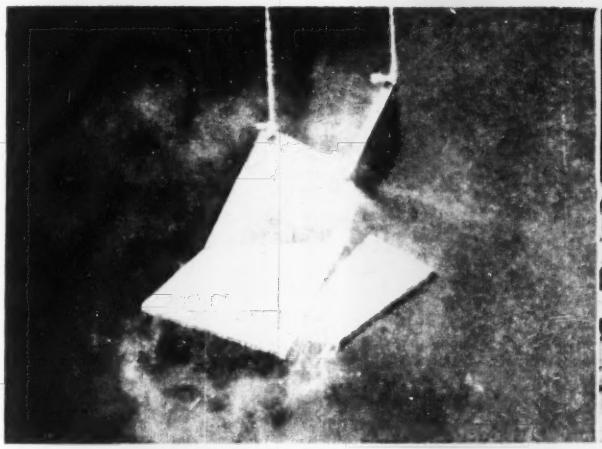
MULTIROL SE

GUIDEROL CT

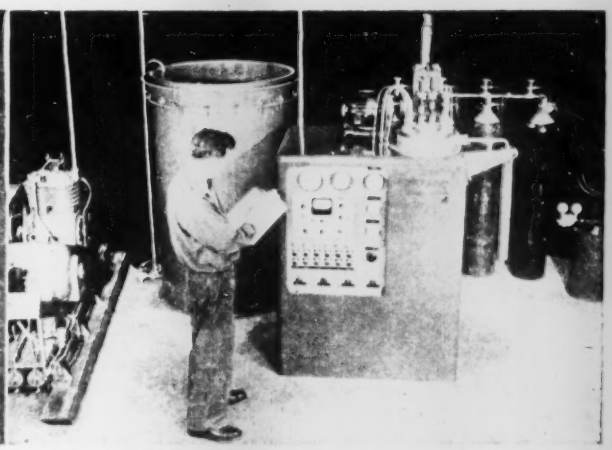
A new 140-page Bearing Reference Guide complete with 30 pages of vital engineering data has just been released by the McGill Manufacturing Company. It has the full story on the advantages of Multirol CF Bearings as well as information on the Multirol CYR, Multirol SE and Guiderol Bearings. Send now for your copy of McGill Catalog No. 52.

McGILL® — Precision Bearings

McGILL MANUFACTURING COMPANY, INC.
301 N. Lafayette Street, Valparaiso, Indiana



Steel plate shatters like a pane of glass at low temperatures. Liquid helium is used as the cooling medium



Typical installation includes compressor, gas holder, cryostat, helium gas cylinders and a charcoal cap

Materials at Low Temperatures

Research offers new insight into such matters as behavior of metals at high temperatures. General rule is that strength tends to increase as temperatures fall

CRYOGENIC research in the area of −460° F (absolute zero) is opening up new frontiers in metallurgy.

Growing emphasis on more powerful refrigeration and the liquefaction, transportation and storage of gases, for example, finds the engineer turning to the metallurgist for the right metal to fit a given low-temperature application.

Metallurgists, in turn, are discovering that low-temperature work offers new insight into such matters as the fundamental behavior of metals at high temperatures.

New Light—Martensitic transformation, for instance, has been a controversial subject. Consensus seems to be that the reaction involves a nucleation process, which requires activation; and that activated nuclei develop into martensitic plates with tremendous speed. Trouble is that several theories are extant to describe the nature of the nucleus and the mechanism by which it propagates.

Plastic deformation and straight cooling experiments (using commercial steel specimens at near absolute zero) indicate the steel hardening process involves a co-operative, shearlike sliding of many atoms that move in unison.

Research shows that large amounts of this transformation could occur even at liquid helium temperatures — point at which it was previously assumed that all such processes had come to a complete stop. In fact, some steel that has little martensite at room temperature exhibits nearly 100 per cent at low temperatures. In others, hardening does not begin until −240° F is reached.

Strength—General observation is that strength of metals increases as their temperatures are lowered. At low temperatures, they resist deformation, while at high temperatures, they undergo flow when stressed.

Another generality is that metals become less ductile as their strength is increased. This appears to be true whether increase in strength is brought about by altering composition, changing microstructure through heat treatment or by reducing temperatures. However, relative loss of ductility brought about by the three methods is not necessarily of the same order.

Problem—Engineers would find low-temperature applications relatively simple if strength were their only concern. Copper, for instance, has a tensile strength of 32,500 psi at room temperature. At −300° F, it exhibits tensile strength of 50,500 psi. Iron that tested out at 46,000 psi at room temperature had a tensile strength of 112,000 psi at −300° F.

Number one problem facing the engineer is embrittlement, and while the tension test gives him figures in terms of unit stress, there is no test that offers corresponding values for brittle failures resulting from stress concentration or sudden (though temporary) overloading.

To get some evaluation of relative resistance of materials to brittle behavior, impact tests are used. Charpy, simple-beam method is generally preferred because it is quicker and easier to place

what makes a

Champion?

SHREWD COACHING, strategic planning, resourcefulness, teamwork, and the will to win are prime requisites for any championship football eleven.

The requirements are much the same in our game.

When you select an industrial contractor, you want a responsible organization coached by keen, aggressive executives and manned by an experienced staff which displays ingenuity, as well as skill and teamwork.

The Commercial Contracting Corporation team is proud of its qualifications and accomplishments—of its reputation for doing quality work quickly and economically.

Whether a project is large or small, every aspect of the work is carefully planned in advance. Every operation is supervised by experts, expedited by top management.

Just as any good football squad welcomes a chance to compete, so this seasoned industrial team welcomes the opportunity to bid on any project involving one or more of the many CCC services.

CCC services, provided individually or under one PACKAGE contract, include:

• General Construction • Building Alterations • Demolition • Foundations • Press Erecting • Machinery Moving • Crane and Conveyor Installing • Equipment Warehousing • Steel Fabricating • Export Packaging •

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Zirconium Resists Corrosion

Good substitute for tantalum, it has proved itself in work with acids, alkalies

CORROSION resistance is the main reason for industrial interest in zirconium. Hot, 20-per-cent hydrochloric acid does not attack it appreciably and it can be used as an acceptable substitute for expensive tantalum. In fact, its resistance to strong alkalies is superior to that of tantalum.

Zirconium ingots can be forged or rolled in air like other metals without serious scaling. In the form of hot rolled bars, it has tensile strength of 97,000 to 113,000 psi with an elongation of 9 to 14 per cent.

Properties — Annealed sheets have the following range of properties based on tests conducted by Titanium Alloy Mfg. Div. of National Lead Co.:

Yield strength, 0.2 per cent offset—56,000 to 72,000 psi

Tensile strength—76,000 to 83,000 psi

Elongation in 2 inches—13 to 19 per cent

Minimum pin diameter in bending—3.75 to 7.5 times thickness

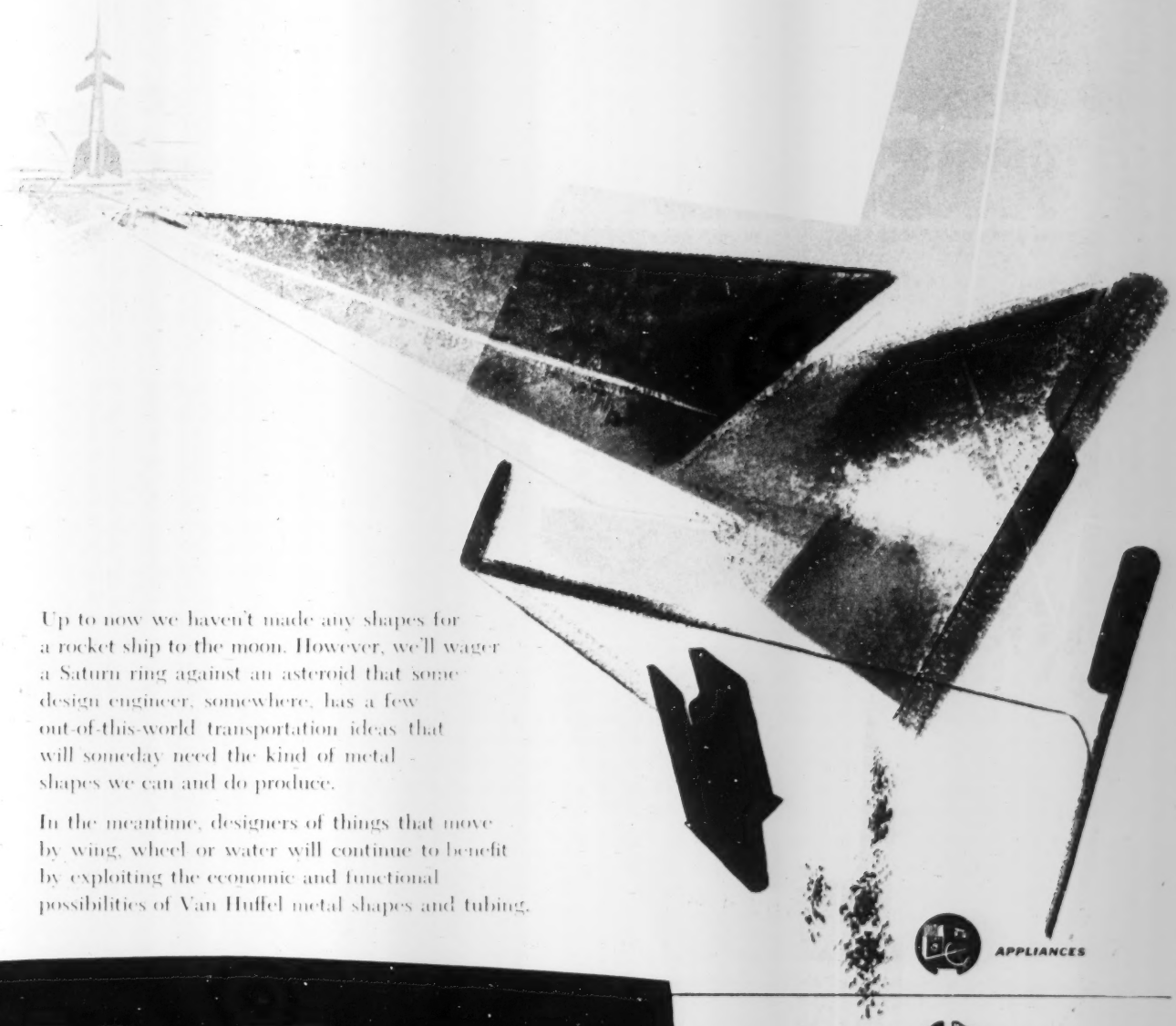
Rockwell A Hardness—50 to 55

Tubing—Zirconium tubing, both seamless and welded, is expected to be available shortly. Satisfactory production methods are being worked out. Even though the specific gravity of zirconium is somewhat lower than that of steel, its ratio of strength to weight is not as favorable as the ratio of titanium to steel.

Zirconium of high purity, with hafnium removed, has a special field of application in atomic reactors where its corrosion resistance and lack of neutron absorption make it valuable.

Allegheny Ludlum Steel Corp. is rolling a special grade of high purity zirconium (with hafnium removed) for atomic energy applications. AEC's Oak Ridge Nationai Laboratory developed the method for removing hafnium from the zirconium. U. S. Bureau of Mines has been producing pure zirconium and melting it into ingot form. Allegheny will do hot and cold rolling to produce sheet

space-ship shapes



Up to now we haven't made any shapes for a rocket ship to the moon. However, we'll wager a Saturn ring against an asteroid that some design engineer, somewhere, has a few out-of-this-world transportation ideas that will someday need the kind of metal shapes we can and do produce.

In the meantime, designers of things that move by wing, wheel or water will continue to benefit by exploiting the economic and functional possibilities of Van Huffel metal shapes and tubing.

Van Huffel

TUBE CORPORATION · WARREN, OHIO

where ideas take shape *for the industries that serve the nation*

APPLIANCES

BUILDING CONSTRUCTION

METAL FURNITURE

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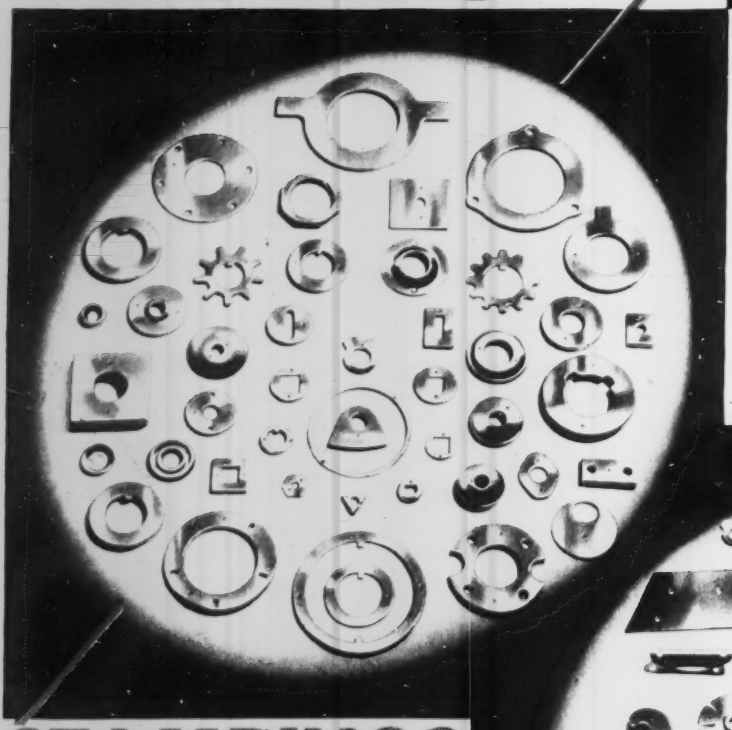
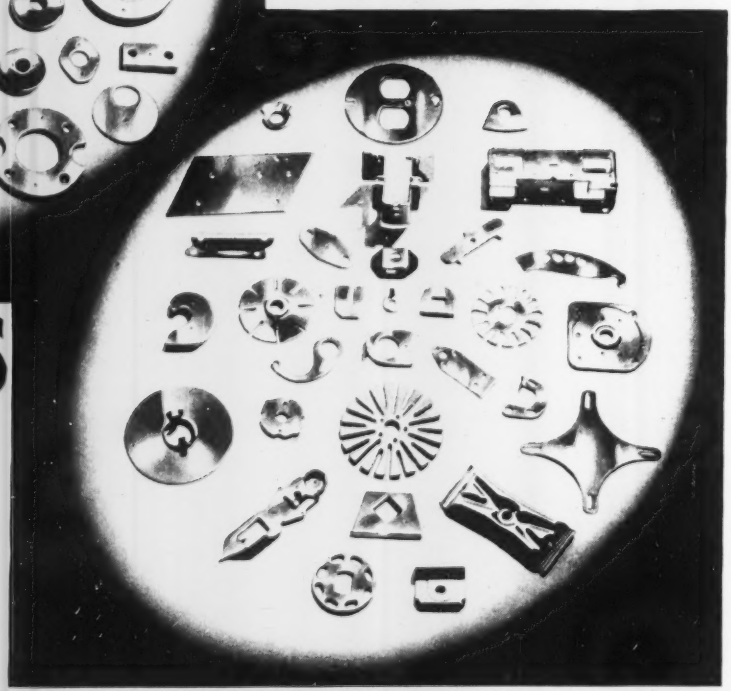
Your Most DEPENDABLE and EXTENSIVE Source of Supply for ALL Types of Standard and Special WASHERS

MILWAUKEE
WROT WASHERS

SINCE
1887



Washers are stocked in thousands of different sizes, including all standard and semi-standard sizes. If your requirements cannot be met from this extensive inventory, more than 25,000 sets of dies are available to take care of special orders, or we will make up dies to meet your individual needs. *Write for Catalog "30" — 76 pages covering full line of washers, tool list for producing washers, helpful reference tables and other data.*



STAMPINGS

Large scale production facilities enable us to effect worthwhile savings, in many instances producing stampings more economically than possible in our customers' own plants. Our own tool and die-making shop enables us to make up dies necessary for producing new stampings, working directly from your blueprints.

Let us quote on your requirements . . . covering fabrication in any material and in any finish. Furnished machined, heat-treated or surface ground, as may be specified.

WROUGHT WASHER MFG. CO.

THE WORLD'S LARGEST PRODUCER OF WASHERS

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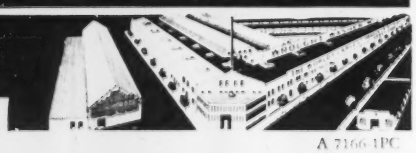

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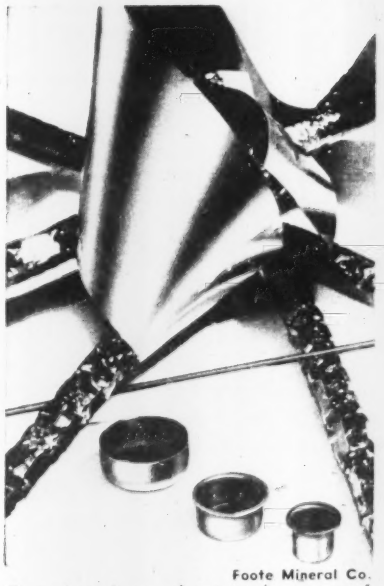


Foote Mineral Co.
Zirconium bars, sheet and group of products. Powders also are made

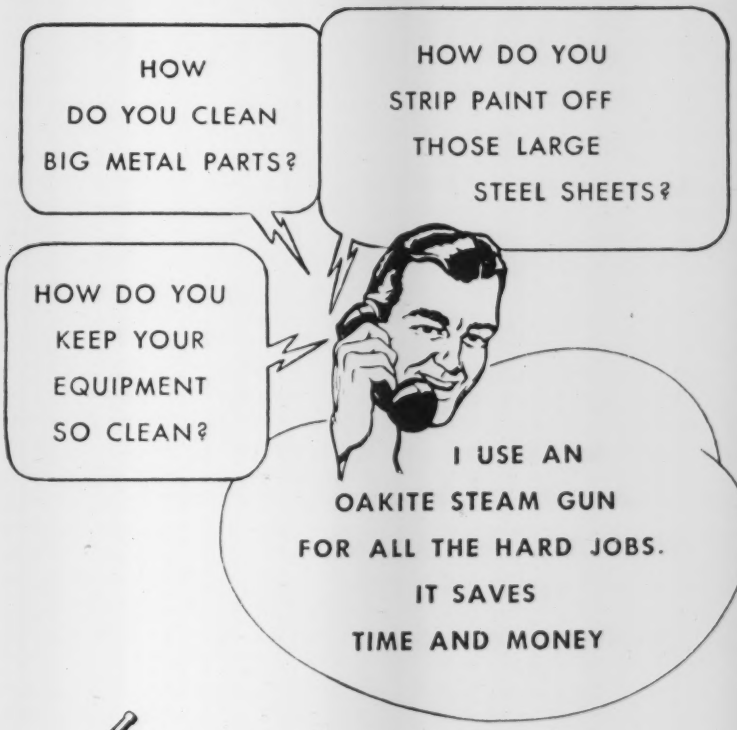
zirconium. Unique furnaces have been installed to handle the double melting procedure involved in this operation.

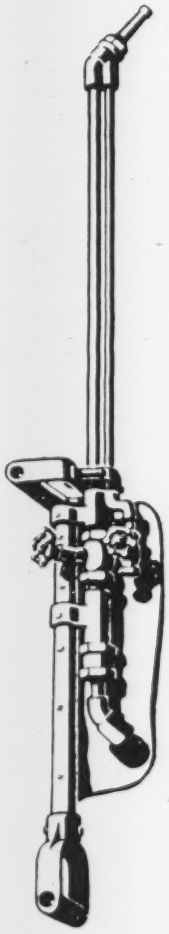
Zr Powder—Metallic zinc powder is being used for absorbing last traces of gas in vacuum tubes and for hastening combustion of flash powders and explosives. Applications are based on the metal's extreme reactivity with oxygen and nitrogen in the high temperature ranges.

Titanium Alloy Mfg. Div. of National Lead Co. has developed methods for quantity production of a grade EE powder that is specially free from volatile metals, such as calcium and magnesium. It's desirable for use as a "getter" or stabilizer of gases in the interior of vacuum tubes.

Mechanism—Grade EE powder is generally coated on a part inside the tube that reaches a sufficiently high temperature for the zirconium to become reactive and form stable solid compounds with oxygen or nitrogen in the tube.

Grade F recently was developed with particles having irregular shapes but uniform fine size. This material, less expensive than purer grade EE, is used for such purposes as primers and flash powders. In this instance, extremely rapid rate of combustion in air is desired.





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- brass reduction machines
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- buffing machines
- forge hammer parts
- drill presses
- stamping machines
- motors

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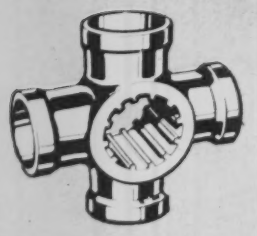
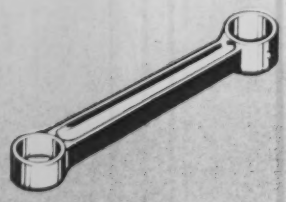


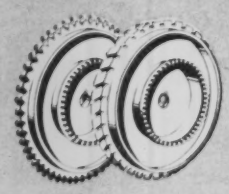
DETROIT BROACH TOOLS PROPELLER HUBS

Detroit Broach tooling for aircraft engine parts began with reciprocal engine designs. A typical example was the Detroit Broach tooling to produce the spline inside propeller hubs. In one pass, broaching produced a complete spline with consistent accuracy. This led to more accurate spline broaching in many other fields, too.



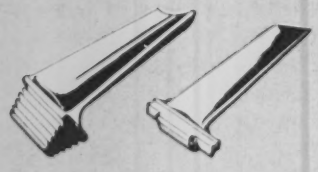
DETROIT BROACH TOOLS ARTICULATING RODS

As radial engines came to the forefront, new challenges in precision tooling were met by Detroit Broach ingenuity. Typical of reciprocal engine parts broached were articulating rods. Detroit Broach tooling produced a better finish and greater accuracy on the machined surfaces of these parts.



DETROIT BROACH TOOLS TURBINE AND COMPRESSOR WHEELS

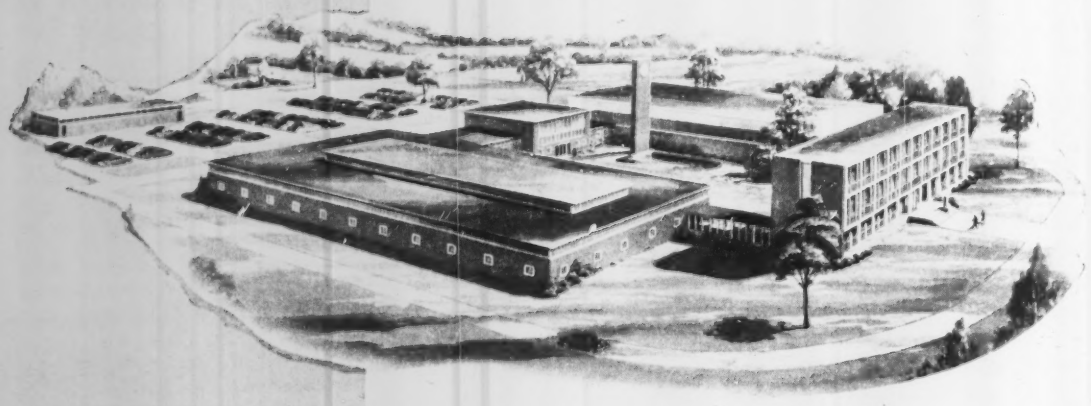
With the advent of jet engines, the need for close-tolerance repetitive accuracy was even more acute. In addition came the problem of working with high-alloy, heat-resistant, tough-machining metals. Compressor and turbine wheels are typical of the parts for which Detroit Broach tooling is meeting all requirements with flying colors. Varied forms of slots are produced in these wheels, square, at helix and at conical angles to the axis.

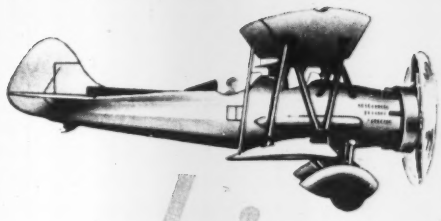


DETROIT BROACH TOOLS TURBINE AND COMPRESSOR BLADES

Mating parts to compressor and turbine wheels, the compressor and turbine blades are two more parts on which Detroit Broach tooling turned the trick. Intricate "Christmas Tree" forms, dovetail and "Ball Root" forms are easily produced with accuracy. At the same time, production costs are rock-bottom and surface finishes generally need no further machining.

This is a view of the new, ultra-modern Detroit Broach plant and offices located in Rochester, Michigan—just outside Detroit. Designed by Sture Frolen, eminent Swedish architect, it embodies many important advancements that contribute to employee morale and manufacturing efficiency. Another example of the unusual facilities of Detroit Broach Company.





Broaching Pioneers

IN THE AIRCRAFT INDUSTRY

Since the price of poor fits on engine parts may be paid in human lives, the aircraft industry was quick to recognize and adopt the inherent accuracies of broaching.

It was quick, too, to recognize the ability of Detroit Broach to engineer and produce tooling that met the need for concise repetitive accuracy . . . tooling with important production economies as shown on the opposite page.

in YOUR industry, too you will find many examples of Detroit Broach tooling that is producing repetitive accuracy, part after part after part. Just as important, it is tooling that consistently makes good common sense in terms of efficient operation and rock-bottom cost-per-piece broached.

These benefits that accrue Detroit Broach customers are not achieved by magic or by gift. They are the result of years of specialization in one important field . . . broaching. Every person, every machine, even plant facilities at Detroit Broach are geared to that single purpose.

In broaching it will pay you, too, to have a talk with Detroit Broach Company . . . pioneers in broaching yesterday, today, and tomorrow.

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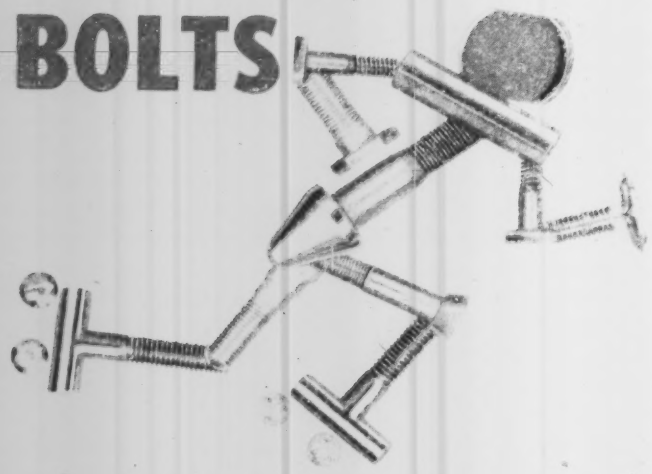

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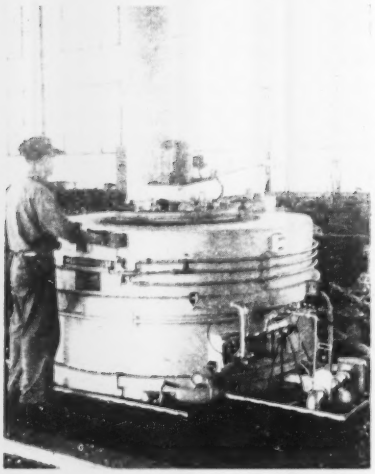
Gas Fired, Pit Furnace

New Westinghouse unit has removeable retort. Thus, continuous operation is possible

A GAS-FIRED, pit furnace for cycle annealing of small hand tools is now available from the Westinghouse Electric Corp. The furnace can also be used for carburizing, hardening and nitriding.

Removable retort makes continuous operation possible since one retort can be discharged and recharged while the other is in the furnace. Maximum operating temperature is 1600° F. Hydraulically-operated furnace cover is suspended from a pivoted arm so it can be easily pushed to either side when raised.

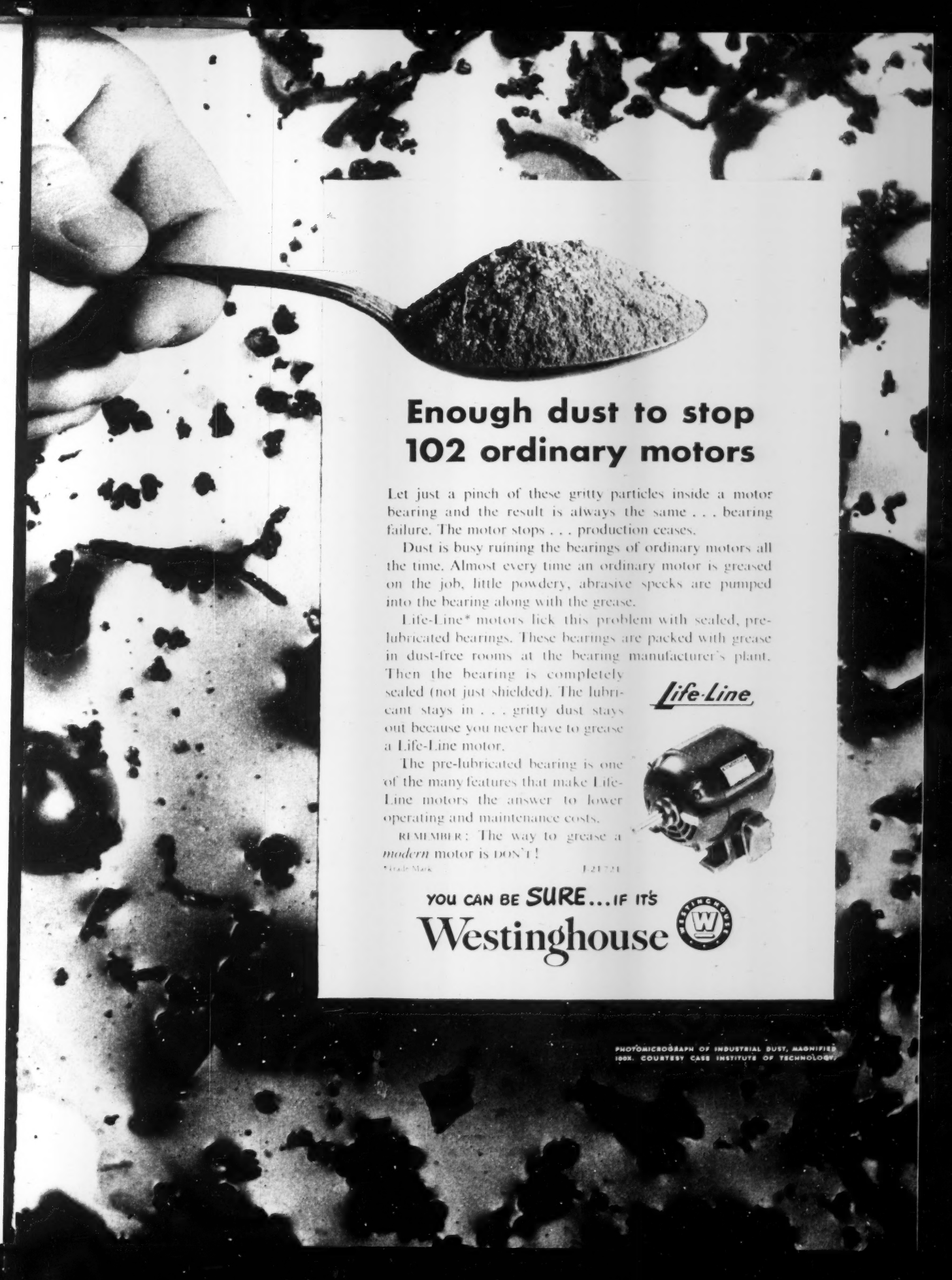


AUTOMATIC GAS-FIRED ANNEALER
. . . carburizing and nitriding, too

Automatic—Firing of this furnace is completely automatic and a combustion blower system is contained for purging and cooling purposes.

In addition, the instruments for turning off the gas supply in the event of flame failure and for shutting off the gas in case of low pressure are provided.

The furnace is available in five sizes ranging from a charge space of 14 inches in diameter by 18 inches deep with an approximate production rate of 120 pounds per hour net to 30 inches diameter by 72 inches deep with an approximate production rate of 2100 pounds per hour net.



Enough dust to stop 102 ordinary motors

Let just a pinch of these gritty particles inside a motor bearing and the result is always the same . . . bearing failure. The motor stops . . . production ceases.

Dust is busy ruining the bearings of ordinary motors all the time. Almost every time an ordinary motor is greased on the job, little powdery, abrasive specks are pumped into the bearing along with the grease.

Life-Line* motors lick this problem with sealed, pre-lubricated bearings. These bearings are packed with grease in dust-free rooms at the bearing manufacturer's plant. Then the bearing is completely sealed (not just shielded). The lubricant stays in . . . gritty dust stays out because you never have to grease a Life-Line motor.

Life-Line

The pre-lubricated bearing is one of the many features that make Life-Line motors the answer to lower operating and maintenance costs.

REMEMBER: The way to grease a *modern* motor is DON'T!

*Trade Mark

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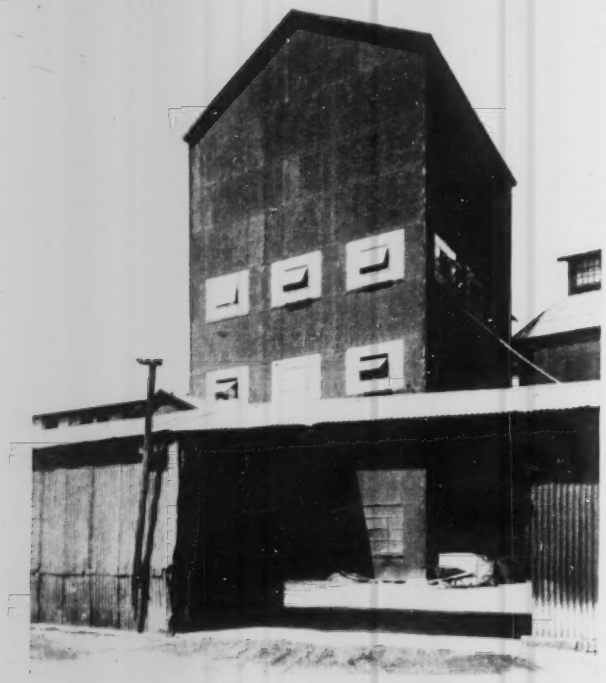
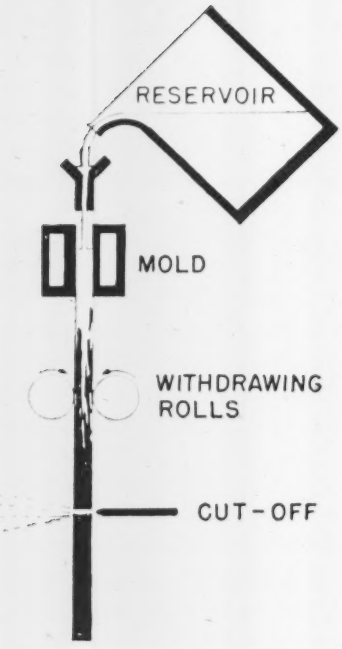
YOU CAN BE SURE...IF IT'S

Westinghouse

PHOTOMICROGRAPH OF INDUSTRIAL DUST, MAGNIFIED 100X. COURTESY CASE INSTITUTE OF TECHNOLOGY.





Status Report On Continuous Casting

After four years of experience, Allegheny Ludlum takes stock of its progress. With most of the kinks ironed out, they are convinced the process has a healthy future

By W. B. PIERCE
Vice president and technical director
Allegheny Ludlum Steel Corp.
Pittsburgh

CONTINUOUS casting of metals is not new, and the patent literature is vast and fascinating. The nonferrous industry uses continuous casting extensively, and we draw from that industry much of our inspiration for further effort when we see what they have accomplished and the effect it has had on the nonferrous mill processing equipment.

With steel or iron base alloys, difficulties are of a greater magnitude due to the higher temperatures involved and lower heat conductivity of steel which is only one tenth that of the common nonferrous materials. For these fundamental reasons, continuous casting of steel is still in the developmental phase.

Commercial machines are being readied for production, so in 1954 continuous casting of steel and steel alloys should be on a commercial basis.

Early Interest—The Allegheny Ludlum Steel Corp. has long been interested in continuous casting for their alloy steel processing. In the mid 1930's, we operated in our Brackenridge Plant a Merle machine which was later abandoned. Alloy steel produced by Mr. E. R. Williams, when he operated his continuous casting plant at Latrobe, Pa., was rolled at the Brackenridge Plant, and in our Dunkirk mill tool steel was produced on a Hopkins machine which is in a sense a continuous casting device.

Our latest and most extensive venture in the field of continuous casting was inspired by our observation of the Rossi-Junghans machine operating on brass. An excellent example of this machine is the one operated by Scovill Mfg. Co. It was installed in 1937, and this process has been practiced by Scovill since that time.

Another Try—Allegheny Ludlum decided to again experiment in the field of continuous casting and in April of 1949 we installed in our Watervliet, N. Y., plant a Rossi-Junghans machine of a design similar to that used in the brass industry. As initially installed, this machine was equipped with a 15 x 3-inch rectangular mold and was designed for a top speed of 40 ipm.

First purpose was to determine the technical feasibility of alloy steel casting. When that was established affirmatively, we then

considered that the operation of a pilot plant had the multiple purpose of:

1. Developing casting data over a range of sizes and grades.

2. Throwing some light on economic factors involved.

3. Developing data useful for the design of a production tonnage machine.

Traveling Mold — Outstanding feature of the Rossi-Junghans machine is the Junghans' principle of the oscillating mold. We have found it successful and simple. Mold travels downward at a rate synchronized with the withdrawing rolls. After a downward movement of about ¾ inch, the mold snaps back to the initial position through a cam and spring arrangement giving a stripping action, and this cycle is constantly repeated.

In the beginning, (April 1949), we did not immediately get satisfactory operation or good castings. After four years, we have arrived at a point where we can cast numerous steel base alloys in a variety of shapes, consistently good in quality. We make a run practically every day, with the material so produced being further processed against production orders.

Plant Tour—Tower in which the pilot machine is housed is 56 feet high. There are three levels the pouring platform which contains the metal reservoir, the tundish, and the mold. The next floor contains the pinch rolls and water spray devices, and on the lower floor is the cutoff and conveyor equipment.

From the height of the machine, it is obvious that the casting is in the vertical position, as are most present continuous casting models. Of special interest is the relatively small amount of floor area occupied and the necessity for adequate height.

The elements shown in Figure 2 are common to most casting machines. These elements are the hot metal reservoir, tundish, mold, withdrawing rolls, and cutoff device.

Easy Timing — Synchronization of the rolls with the oscillation of the mold (Figure 3) is a relatively simple mechanical arrangement. Power is obtained from a single drive motor through a stepless speed changer with a take-off of power to the cams transmitted to the mold through the walking beams to obtain an exact correspondence of the circumferential speed of the rolls with the mold motion. The speed regulation of the entire unit is accomplished by electrical control of the primary speed changer.

A 5,000-pound Ajax induction furnace (Figure 4) is used as a molten metal reservoir. In the pilot type of operation, we consider this furnace a very useful method of obtaining molten metal in that the steel can be melted at the pilot plant instead of transferred to it from the melt shop. Further, we can pour with the heat on and by varying the current can study the allowable casting range and the effect of temperature.

Lip Poured—With this furnace, the metal is lip poured and the stream enters the tundish. The second appearance of a stream is the entry into the mold. Rate of pour is controlled by the operator of the furnace who receives his instructions from the operator positioned at the mold.

In the tundish and in the mold, we protect the metal with an inert atmosphere. Oil lubrication is also introduced directly into the top of the mold and is extremely effective in giving us smooth removal of the casting. Our mold is swivel mounted to adapt itself to any distortion of the casting after it leaves the mold.

Mold Design—Sectional views of the water cooled copper mold which we regularly use are seen in Figures 5 and 6. The horizontal cross section shows a mold for a rectangular billet with eight risers, the water entering at the lower part of the mold and exiting at the top. The flow rate is up to 150 gpm with a temperature rise not exceeding 25° F.

Molds vary widely in design; but we have found the principle of the rigid mold good; and we use it on rounds, rectangles, and slabs. Mold length has been varied from 18 to 36 inches, and at present, our molds are approximately 24 inches long. To reduce wear, the copper is chromium plated on those surfaces in contact with hot metal.

Water Cooling—Area immediately below the mold (Figure 7) shows where the spray rings are directing water and air on the casting to solidify the metal. We introduce up

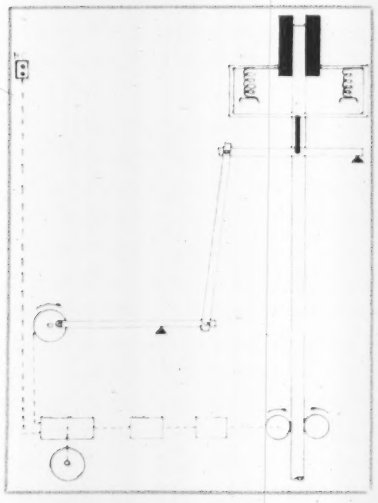
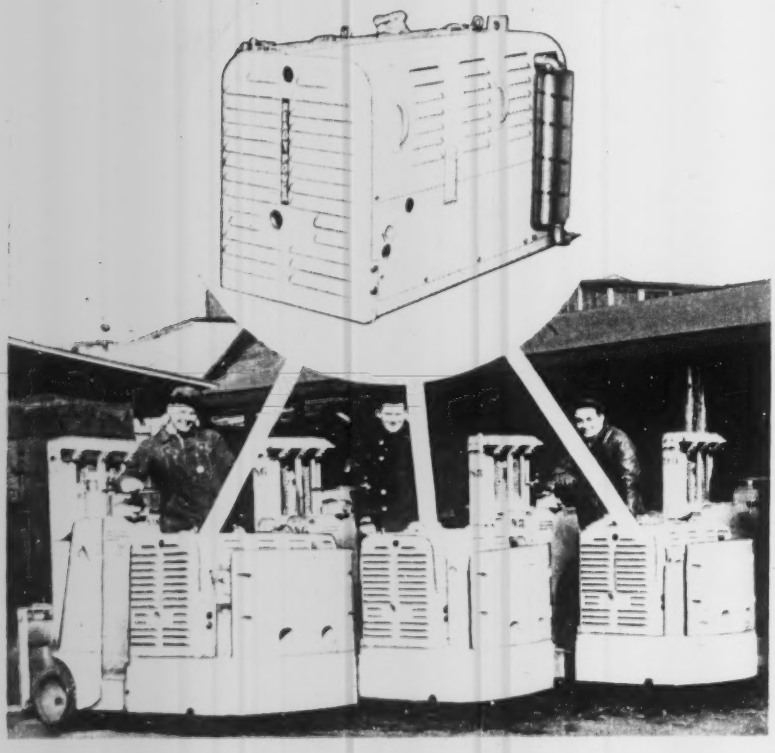


Fig. 3—To synchronize rolls with oscillating mold, arrangement at left of walking beam, cams and speed changer has been successfully worked out

Fig. 4—This 5000-pound Ajax induction furnace is used as a molten metal reservoir at top of pouring tower

Ready-Power is the only Interchangeable gas-electric power unit



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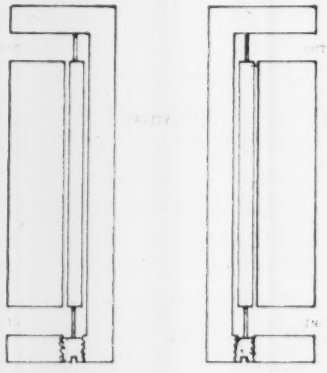
to 200 gpm through the spray rings. Water is stripped from the casting and diverted from the machine by the device shown above the pinch rolls.

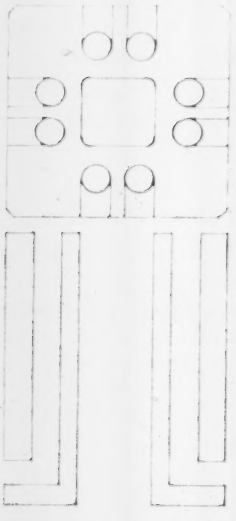
The casting enters the pinch rolls immediately below the tank which catches the spray water (Figure 8). Power on these rolls is not great, for with our machine they function primarily to steady the casting with very little power required for the downward motion.

Some portions of the mechanical arrangement synchronizing the reciprocation of the mold with the withdrawing rolls are shown in this picture. Maximum speed which we can attain with our present equipment is 60 ipm, and this speed has been reached on rounds up to $5\frac{1}{2}$ inches in diameter.

Powder Cut-Off — The cutoff torch, (Figure 9), is manually op-



Figs. 5 & 6—Sectional views of the water-cooled copper mold. To reduce wear, copper is chrome plated on those surfaces which contact the hot metal



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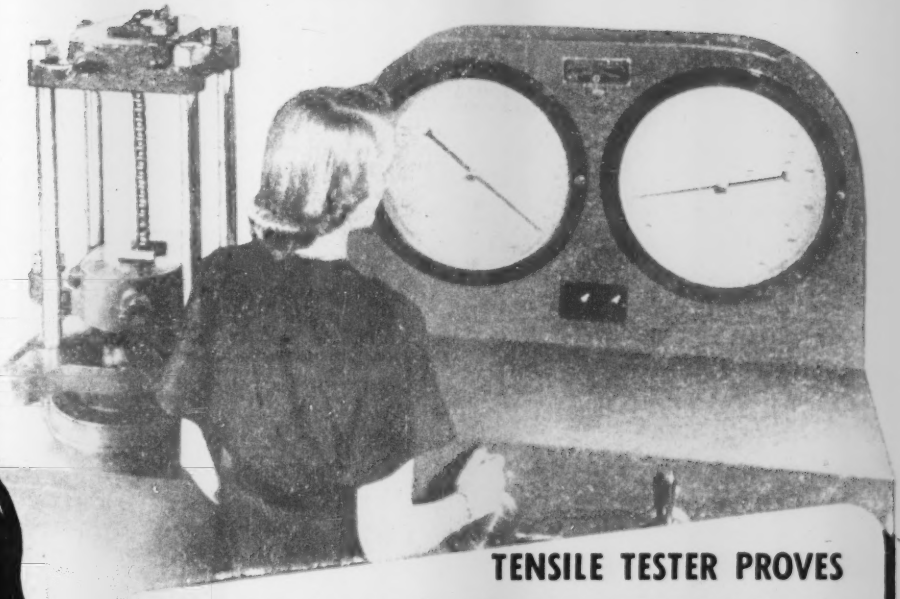

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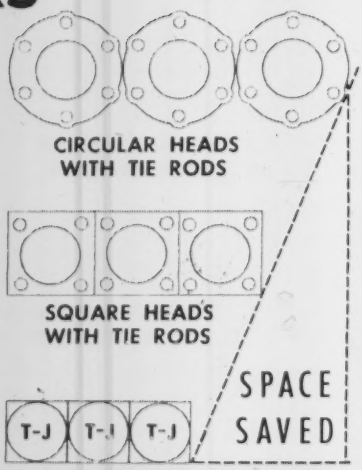

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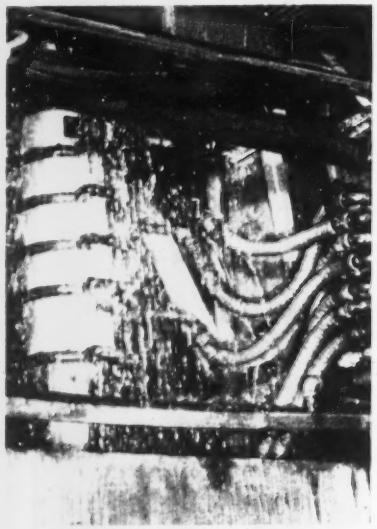


Fig. 7—Immediately below the mold, spray rings direct water and air on casting to solidify the metal. Up to 200 gpm is sprayed through the rings

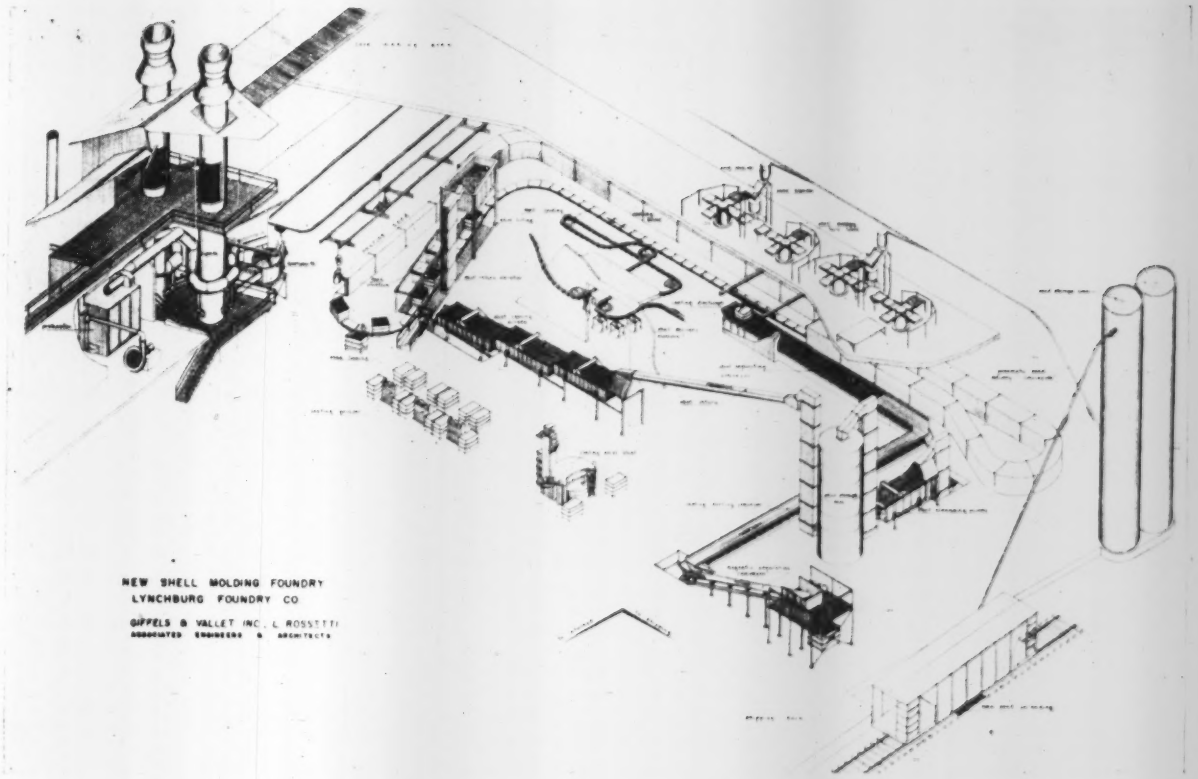
erated and supported on the casting by a bracket. A Linde powder torch is used for cutting off stainless steel, and the time involved is quite adequate at the rates at which we are casting.

Figure 10 is taken from the conveyor position as approximately six feet of cast rectangle is about to drop onto the conveyor. It is not necessary to handle the material gently for the free drop here is several feet.

Grades Cast—The table in Figure 11 summarizes the grades which we have cast. For the most part, the material has been produced in $3\frac{3}{4}$-inch square and $5\frac{1}{2}$-inch round sections. A 9-inch round, 15 x 3-inch slab, and $4\frac{1}{2}$-inch round molds have also been tried. Most of our investigational work has been on the stainless steel grades.

All sections have a typical cast structure illustrated by these round and square castings (Figures 12 and 13) in 18 per cent chromium-8 per cent nickel. The fine grained exterior surrounds a dendritic structure extending to the center. The distortion due to shrinkage pulls the circular cross section out of round as it attempts to stabilize in three triangular sections.

In a rectangle this shrinkage is less severe and results more in side and corner angle distortion



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Write for Bulletin SL-28. It describes and illustrates C-F Lifters money and time saving advantages

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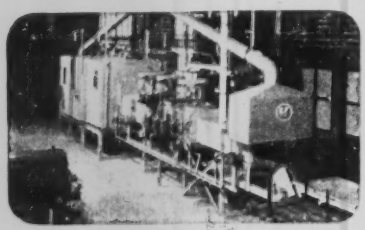

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EF Gas Fired Forced Convection Continuous Roller Hearth Special Atmosphere Furnace Bright Annealing Long Straight Lengths of Tubing.

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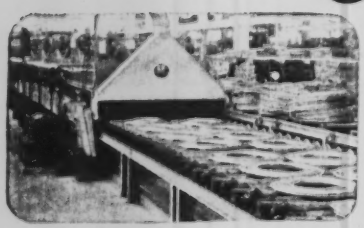

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which can be compensated for in the mold. For instance, our rectangular mold is designed with 100-degree corner angles. In rolling the material to salable size, we have not encountered much difficulty with pipe. The piping that occurs is intermittent and generally heals when rolled.

4 to 1 Reduction—It has been our experience that a four to one reduction in section is necessary to break up the cast structure and to obtain final physical properties comparable to the conventional product. Although the grain structure of the continuous casting is somewhat finer, it still follows the same principles of regular ingot reduction for proper grain size.

Surface is comparatively good Conditioning is done after an initial hot rolling, and it is about the same as on our regular bar billets. With slab sections designed for strip production, our experience has not been extensive, and surface quality equal to that of our slabs rolled from heavy ingots has not been obtained.

Operating Techniques

In running the continuous casting pilot machine so far described, we have accumulated valuable experience and data and have formed some definite opinions regarding the proper operation of this equipment.

The induction furnace is used

Fig. 8—Casting enters pinch rolls immediately below tank that catches spray water. There is little pressure on these rolls. They serve primarily to steady casting during movement

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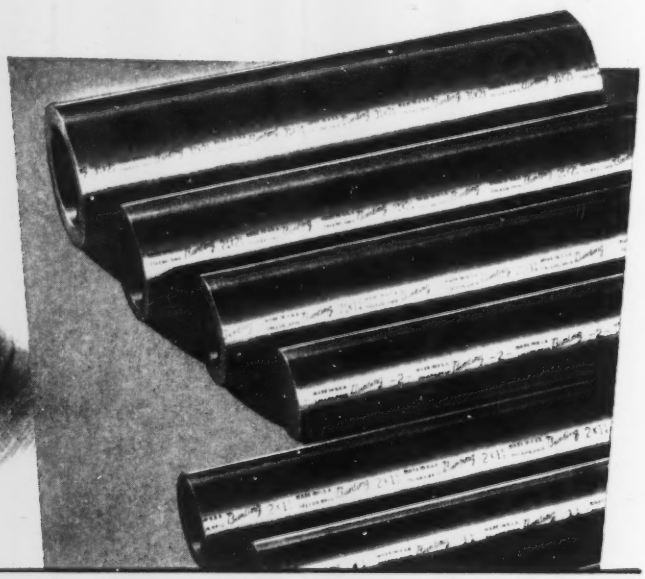

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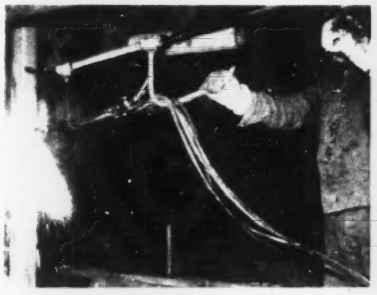

Fig. 9—Cutoff torch is manually operated and supported on the casting by a bracket. Powder is cutting agent

because it gives accurate control over a range of temperature to permit exploration of the permissible casting temperature range. Although this is ideal for pilot plant work, we can handle only about twenty heats before extensive repair is necessary, so we would prefer for production use a metal reservoir which is less fragile.

Our experiments with heated ladles are not complete, but they indicate that a large quantity of molten metal can be held at a uniform temperature in an insulated ladle with a burner directed from the top.

Unheated Tundish—In our early experiments we used an induction heated tundish. Later we simplified it and are now using an iron box lined with a rammed refractory and a zirconia nozzle in the bottom. We apply no heat with the exception of the initial flame to bring the unit up to temperature.

Considerable design and patent work have been done on the tundish for this is one of the points at which we attempt to obtain automatic flow control. Our experiments on this phase of the work have been wide and fruitful for many methods of flow control are available.

Magnetic flow control is entirely possible, and the use of special refractory stoppers and nozzles has been encouraging. Generally, in our pilot operation, the casting rate is such that we dispense with automatic flow control and rely upon the experience and co-operation of our trained operators.

Refractory Success — The outstanding refractory which we have tested is a high temperature stabilized zirconia produced by the Norton Co. At first we tried this material in the form of long down spouts from the tundish to the mold and even attempted to place these down spouts and distributors under the molten metal level.

In this we were not successful; and as we continued to simplify the machine, it was found that the down spout could be eliminated as a smooth pouring stream caused no undue turbulence in the mold.

Propane Atmosphere — In the tundish, as well as in the mold, we protect the metal with a controlled atmosphere. Argon was tried as well as city gas. These methods were found inadequate and led to the use of propane which is now burned in the mold and tundish to reduce oxidation.

Having achieved a steady flow of metal of closely controlled temperature from the tundish into the mold, we made studies on mold design, lubrication, mounting, and casting speed. For the most part, we have preferred and used the rigid mold machined from a solid block of copper and chromium

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plated on the interior surfaces. It is swivel mounted so that it can adapt itself to any distortion of the casting after it leaves the mold.

No Metal Sticking—Lubrication is introduced in substantial quantity into the top of the mold, and we find this very effective in improving casting surface and preventing any tendency of the metal to stick to the mold.

Water flow into the mold is not high, generally being about 100 gpm, and the temperature of this cooling water seldom increases over 20° F.

Reason for this limited cooling effect is that in the mold only an outer skin freezes on the casting, and we depend upon the area between the bottom of the mold and the pinch roll for the insertion of the water and air sprays to complete the cooling.

Mold Advantages—Our experience is limited to the oscillating mold, and we think very highly of it. One of the initial advantages claimed for this invention of Mr. Junghans was that it presented an ever changing surface to the molten metal thus enhancing cooling. This is probably so, but we have observed at Watervliet that one of the main advantages is to decrease the sliding friction between the mold wall and the casting thereby avoiding hanger cracks.

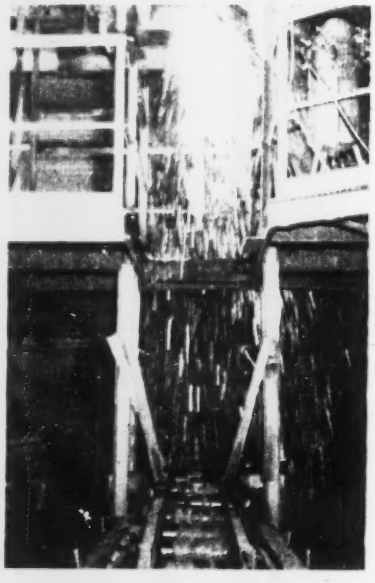
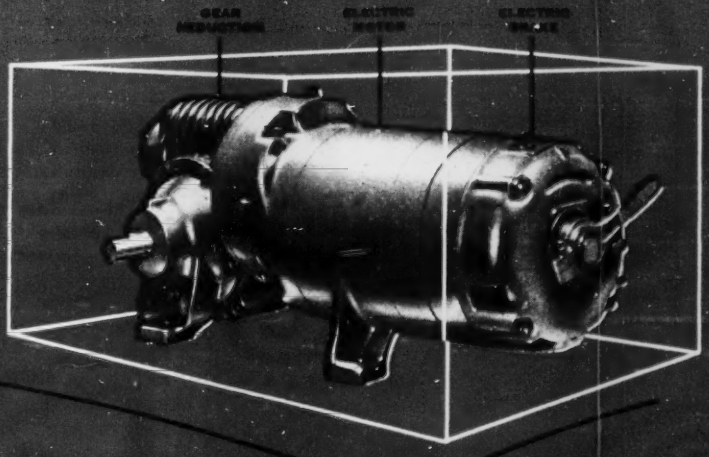


Fig. 10—Six foot section of cast is about to drop onto the conveyor. The ingot has a free drop of several feet



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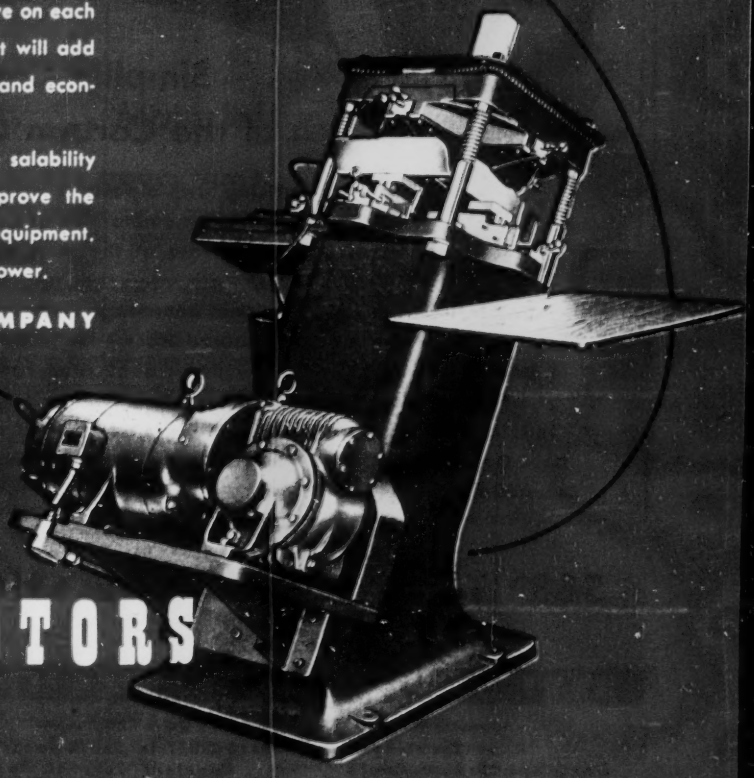

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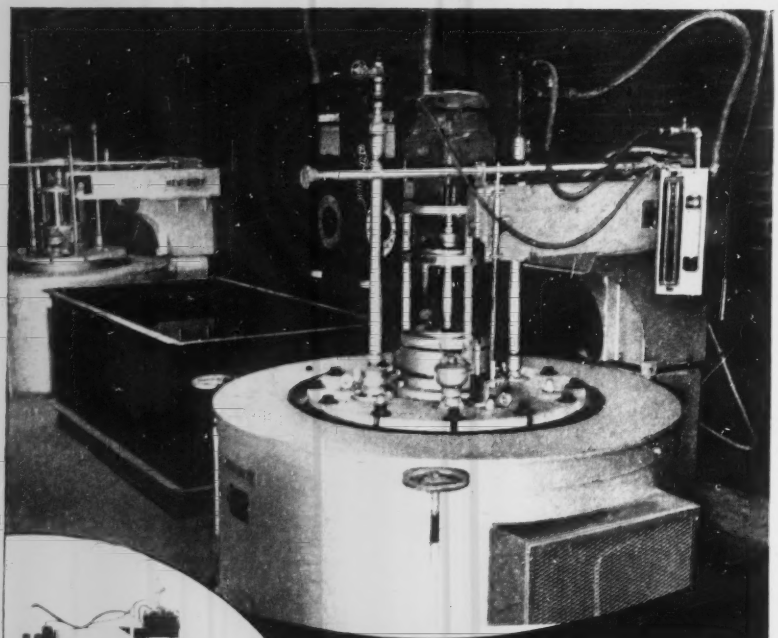

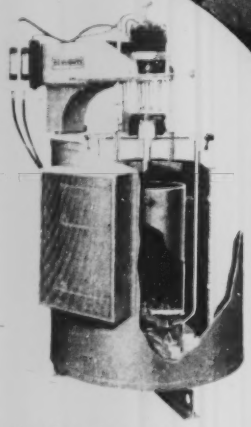

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Fig. 11—Grades that have been cast by A-L. Most of the material was either 3¾-inch squares or 5½-inch rounds

Since the critical portion of a mold is in the upper few inches where the molten metal is actually in contact, we find that the magnitude of the oscillation is entirely adequate to allow effective lubrication near the molten metal level. A few inches below the metal level in the mold the skin has solidified and the casting pulls away from the mold wall. The air space thus created prevents further rapid cooling.

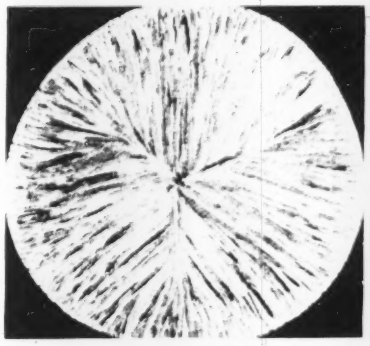
Flexible Cooling—Below the mold our spray ring area is designed for a flexible operation in regard to the volume of water, its velocity, and the positioning of the spray rings. This is the critical coloing area, for the molten core of the material at a proper casting speed extends to the pinch rolls. Often the material enters the pinch rolls with a molten center, but of course it must be entirely solid before it reaches the cutoff station.

Distance between the bottom of the mold and the cutoff station is critical in the design of a continuous casting machine. To cut into a molten area will allow the system to drain from the tundish down and, although this is an excellent metallurgical adventure, it is hazardous. In the operation of our machine, this has actually occurred. It has allowed us to gain an excellent picture of the manner of solidification.

Casting Rates Critical—One of the major assignments in this pilot plant operation is to determine the proper casting rate for each grade in each size. We agree with other investigators that the casting rate on rounds varies directly with the diameter; however, we further find that the type of steel and the nature of the section have a very great influence on the casting rate

as does careful manipulation of the water spray in the cooling area.

Maximum speed on our machine is 60 ipm, and we have obtained this speed on 5½-inch diameter sections. We believe that much higher speeds can be obtained on sections smaller than this, but we have not been able to try them due to the mechanical limits of the machine. Our casting rates have

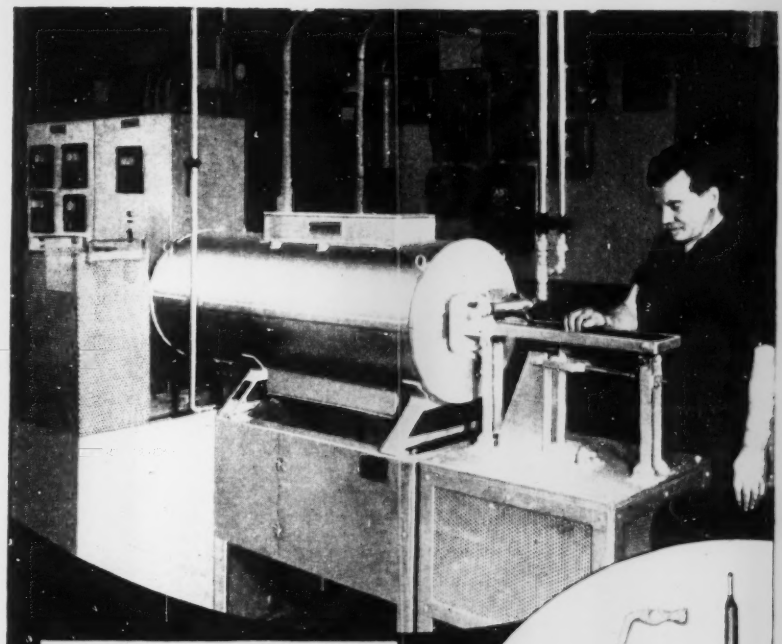


Figs. 12 & 13—Typical cast structure is illustrated here. Both are 18-8 stainless samples. Fine grained exterior surrounds a dendritic structure to the center. The distortion due to shrinkage pulls circular cross section out of round ettempting to stabilize

varied from a few tons per hour up to approximately 16 tons per hour in a single section.

Casting rates are closely studied because of their effect on the economics of the operation, but it should be borne in mind that it is probably practical with this type of equipment to cast more than one section simultaneously and thus the capacity, based upon a single section, can be multiplied.

Fast Cutoff — A fast operating cutoff device is essential. We considered many and finally decid-



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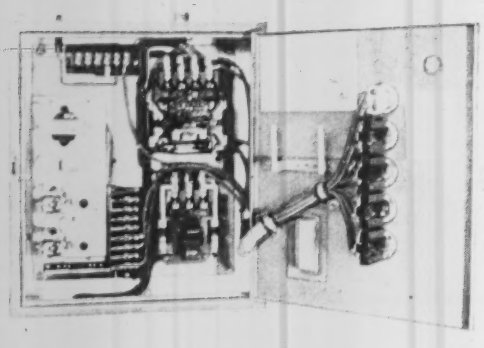

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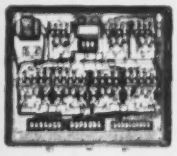

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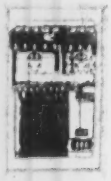

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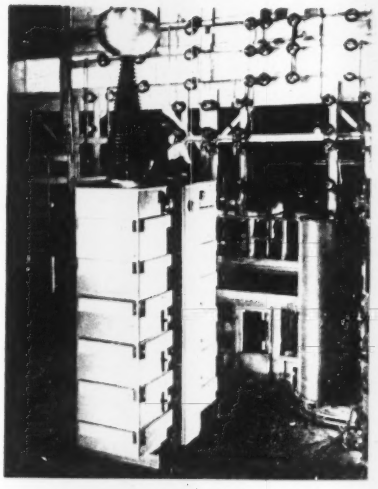

Experience gained in building and successfully testing this 600-kv, single phase power transformer is being put to use by Allis-Chalmers in constructing six 345-kv, 200,000-kva auto transformers for Bonneville Power Administration. A-C engineers predict "big apple" corona shields will become familiar sights in the future

ed upon the Linde torch of the type originally designed for cutting heavy sections of stainless steel. It has been entirely adequate for our present casting rate cutting through any of the sections which we have cast in about 12 seconds.

Although the term continuous casting is generally applied to this procedure, we have found that our machine is easy to start and stop. We always start on a dummy bar which is a close fit with the mold and extends to the pinch rolls. If operation is interrupted, we can run out the casting, replace the dummy bar, and start again in a relatively short time; thus, metal supply need not be continuous.

Economic Considerations

Operation of this pilot unit has been closely observed by our accounting department and although their studies are quite interesting, the economics of a continuous casting machine are dependent upon several obvious principles.

It has been determined by actual experience that the yield from molten metal to finished stainless steel bar can be increased at least 10 per cent when continuous casting is used in the place of casting in regular hot topped ingot molds

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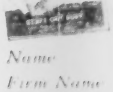

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We also know that the operation of a continuous casting machine is more expensive than the cost of teeming in our regular molds.

First Cost—The machine should cost from one half million to a million dollars. It will require from four to six men to operate it, and the actual casting rate will be less than the teeming rate. From this estimate of initial cost and labor involved, estimates of the cost of continuous casting can be made.

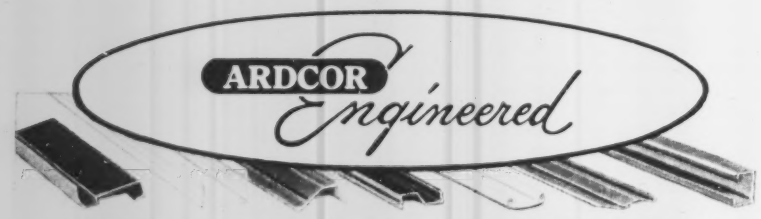
This increased cost can be measured against the desirability of increase in yield. In the stainless steel business, considerable effort is taken to increase yields one or two per cent, and it is an inspiring goal to realize that we can make at least a 10 per cent increase in yield with this machine.

Viewpoint Varies—The view on the first cost of a machine will vary considerably by companies. To a company that possesses excellent, modern blooming equipment and everything that goes with the teeming phase of steelmaking, continuous casting would mean an additional capital investment; but if plans are made for a new steel mill or a mill not integrated with the normal casting facilities and without a large blooming mill, the capital investment for a continuous casting machine to deliver billet size material is comparatively low.

Based upon these simple observations of economics, it is tempting to make some predictions regarding the future of continuous casting. We think well enough of it that we are now designing, with the help of the patent owners, Continuous Metalcast Co. Inc., and with the Freyn Engineering Division of Koppers Co., a new production machine.

Output Multiplied—We are considering equipment that will have 150 sq in of capacity, and we want about 120 ipm casting speed. We would expect a wide range of capacity depending upon sizes and grades, but certainly it should produce up to 20 tons an hour as a single strand caster, and we believe it entirely logical to double this rate with a two section machine.

It is too soon for us to say what the eventual effect of continuous casting will be upon steel mill design, but if you could watch this pilot unit and see its smooth and simple operation and the quality of the product that it regularly turns out, you would realize that the continuous casting process is one which will concern us all in the future and should not be sold short



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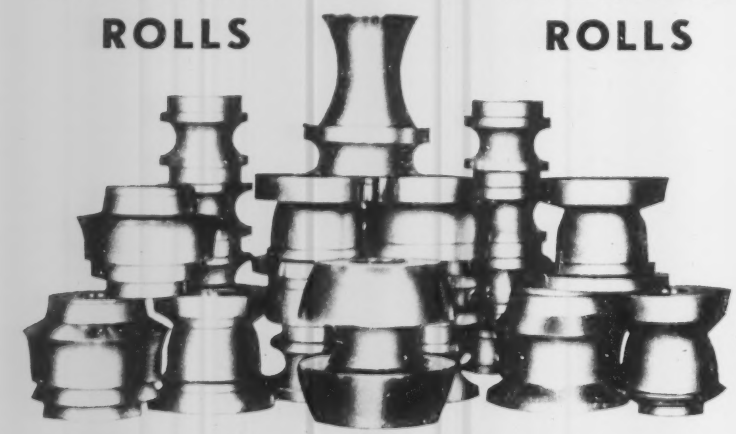
▶ TUBING ROLLS

▶ FORMING ROLLS



▶ *To your specification or ARDCOR design —for all makes of roll forming machines*

Made of ARDCORLOY—a special alloy steel.

Maximum production speeds—better products. Any desired profile up to 36 inches in diameter.

Also, manufacturers of Straightening, Pinch and Leveling Rolls to customer's specifications.

American ROLLER DIE CORPORATION

29520 Clayton • Cleveland (Wickliffe), Ohio

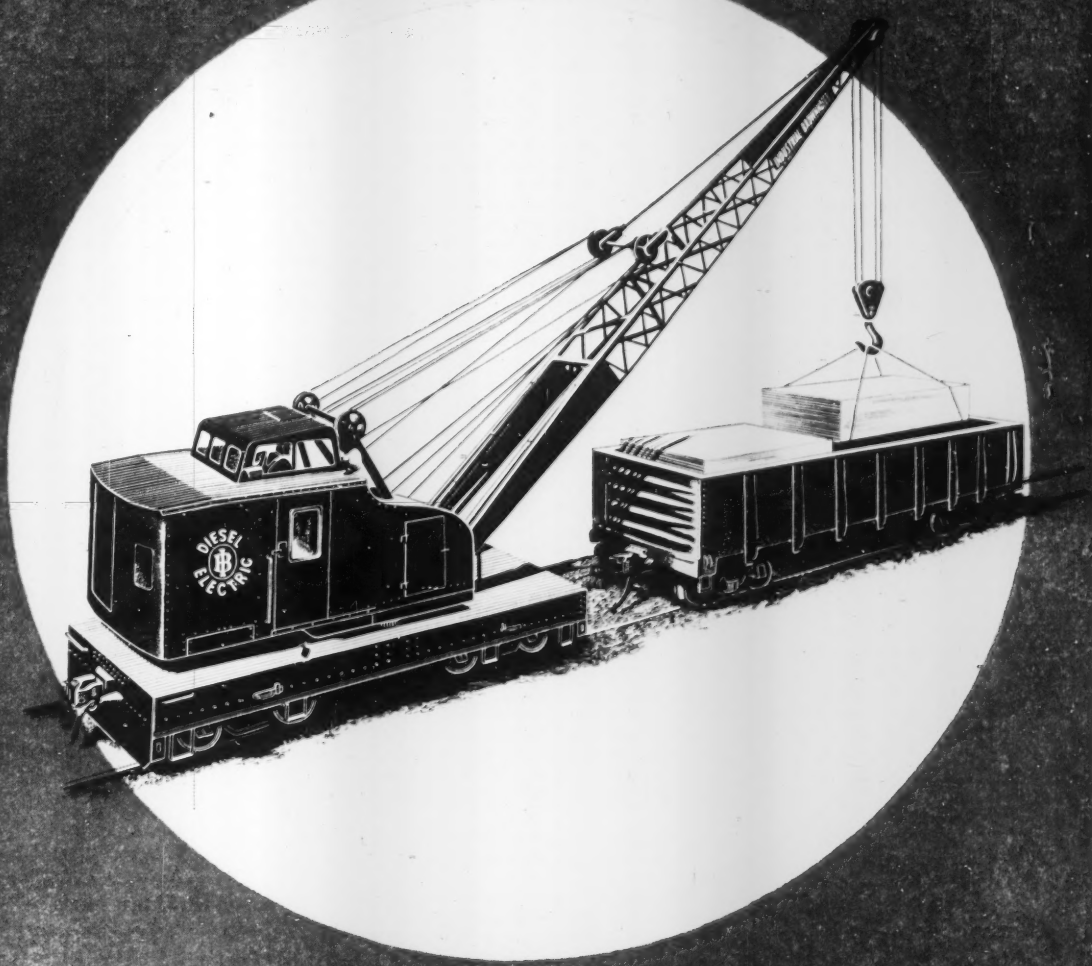
Drying Time 20 Seconds

NEW TECHNIQUE for rapid drying of protective and decorative coatings of inks, paints, and varnishes has been developed by Armour Research Foundation, Illinois Institute of Technology, in a project sponsored by Meyercord Co.

The process, called Chem-Dry, shortens the drying time on coated products from 24 hours to from 2 to 20 seconds. The method was unveiled recently in a pilot plant preview at the foundation's chemistry and chemical engineering building in Chicago.

Combining quality with reduced costs for metal decorating and wire coating, the process hardens coatings of drying oils and resins in a few seconds without the use of heat.

BROWNHOIST Diesel Electric Cranes save time, save labor, save money



Men who know cranes are quick to recognize the fact that Industrial Brownhoist Diesel Electric Locomotive-Cranes provide savings in man-hours, production time and money. Brownhoist Cranes, powerful, efficient units with high tractive power and rapid acceleration, give top performance as a switch engine or as a crane operating magnet, hook or bucket. The patented Monitor-Type Cab and Clear-Vision Boom permit unlimited 360° visibility that helps the operator safely turn out a greater volume of work. The simplified design and accessibility of the moving parts make Brownhoist Cranes easy to maintain and repair. Brownhoist builds Locomotive-Cranes in capacities from 22 to 80 tons.

Write today for complete information.

BROWNHOIST
builds better cranes

INDUSTRIAL BROWNHOIST CORPORATION, BAY CITY, MICHIGAN • DISTRICT OFFICES: New York, Philadelphia, Cleveland, San Francisco, Chicago, Canadian Brownhoist, Ltd., Montreal, Quebec • AGENCIES: Detroit, Birmingham, Houston, Los Angeles

TOUGH JOBS

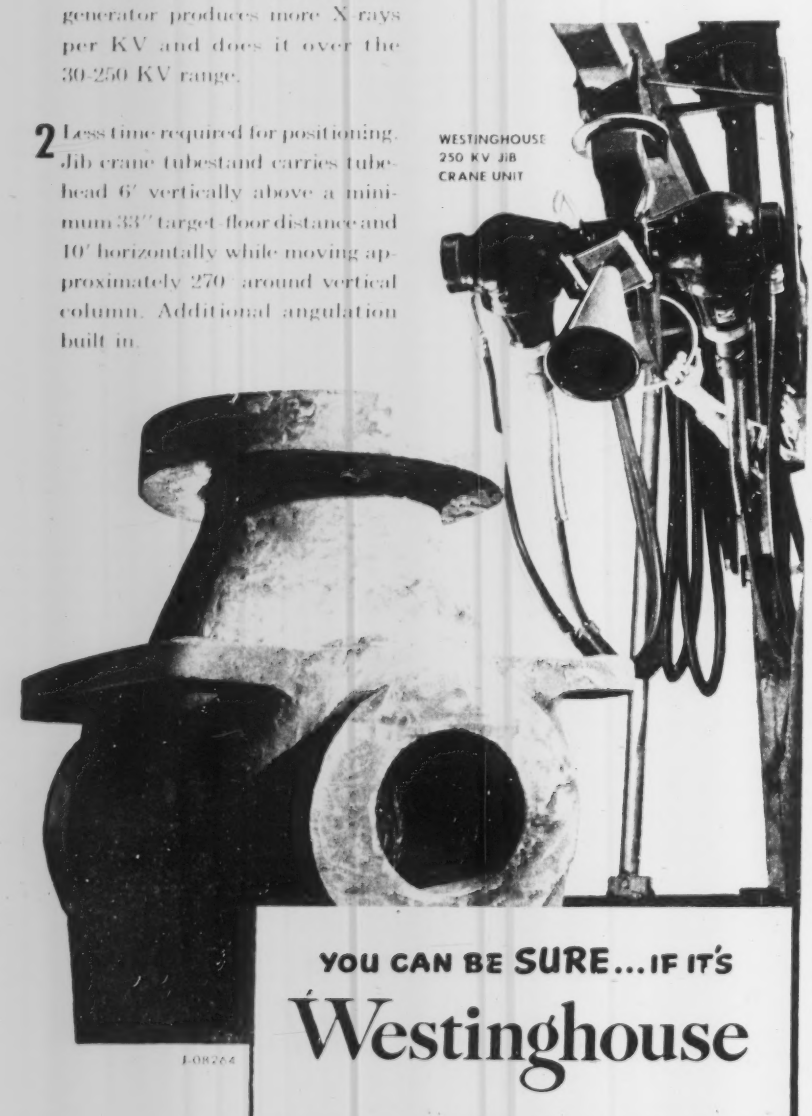
made easy

At American Steel Foundries' plant in Newark, New Jersey, inspection of heavy steel castings is made easy by Westinghouse Industrial X-ray equipment. Reason: extreme *flexibility*.

1 Thick *or* thin materials take less time to radiograph. Westinghouse *Constant Potential* high voltage generator produces more X-rays per KV and does it over the 30-250 KV range.

2 Less time required for positioning. Jib crane tubestand carries tubehead 6' vertically above a minimum 33" target-floor distance and 10' horizontally while moving approximately 270° around vertical column. Additional angulation built in.

Westinghouse assures you the finest, most flexible X-ray tools for your inspection jobs *plus* a coast-to-coast staff of technical experts. Call your Westinghouse X-ray representative or write Westinghouse Electric Corporation, 2519 Wilkens Avenue, Baltimore 3, Maryland.



WESTINGHOUSE 250 KV JIB CRANE UNIT

L-08264

YOU CAN BE SURE... IF IT'S

Westinghouse

Salt Bath Furnaces Gain

Average kw capacity of furnaces doubles in past ten years. Number of applications grows

MORE THAN 4000 manufacturers of metal products have installed modern electric salt bath furnaces to perform heat-treating processes previously impossible or relatively inefficient, according to L. B. Rosseau, vice-president, Ajax Electric Co. Inc., Philadelphia, who recently presented an illustrated talk on this subject at the Cincinnati Chapter of the American Society for Metals.

Among the salt bath furnace applications which have become common in the last ten years, according to Mr. Rosseau, are:

1. Neutral hardening of steels—without oxidation or scaling, and without adding to or subtracting from the carbon content.

2. Hardening of high-speed tools where temperatures as high as 2400° F are needed but where surfaces must remain clean and free of imperfections.

3. Cyaniding to impart a shallow, file-hard case in a relatively short time.

4. Carburizing to add carbon uniformly to the steel's surface.

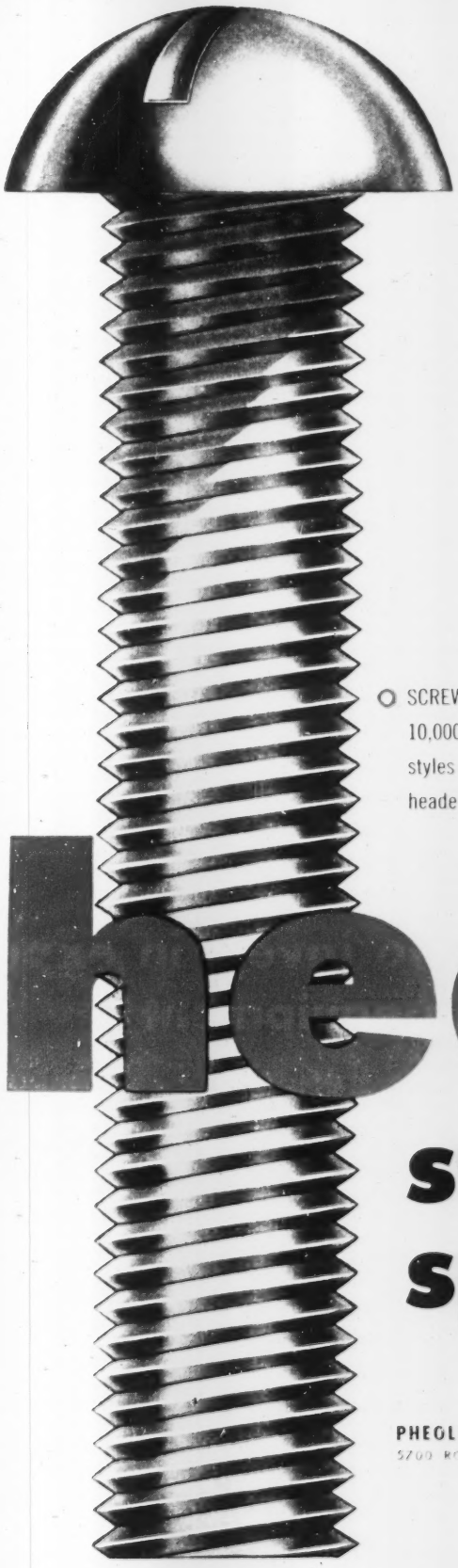
5. Interrupted quenching—austempering, martempering and cyclic annealing.

6. Solution heat-treating of nonferrous metals, particularly aluminum and copper.

7. Descaling and desanding with a minimum loss of the metal treated—well below ½ of 1 per cent compared to losses up to 4 per cent in older processes.

Top Quality—"In most installations, quality control is the paramount consideration," Mr. Rosseau said. "Spoiling a single day's production of high-speed tool steel by faulty heat-treating would involve a loss greater than the total cost of a modern salt bath furnace installation."

He said that the average salt bath furnace in 1952 had a connected load capacity of about 100 kw, compared to 50 kw in 1942. Salt bath furnaces range in size up to 40 feet in length, 20 feet in depth and 8 feet in width, and one descaling and desanding unit has a capacity of 300,000 pounds of salt.



○ SCREWS, BOLTS AND NUTS in over 10,000 standard sizes, types, head styles and finishes. Special cold headed fasteners and other products.

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5700 ROOSEVELT ROAD, CHICAGO 50, ILL.

WHY IT PAYS TO BUY STEEL FROM WAREHOUSE

You don't need to invest in expensive cutting equipment !

WHEN YOU BUY STEEL FROM WAREHOUSE YOU GET:

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- LOWER CAPITAL INVESTMENT
- FASTER PRODUCTION
- FEWER INVENTORY LOSSES

TYING up money in large, expensive steel-cutting machinery is something you can avoid, if you wish. Yet you can have your cutting done on the most modern equipment available. When you order your steel from U.S. Steel Supply, specify just how you want it cut. We will meet these specifications exactly. For example, our flame cutting equipment will follow the most complicated patterns without error and turn out finished shapes precisely as you want them. Your U.S. Steel Supply salesman will give you complete information about our cutting services.

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UNITED STATES STEEL

NEW PRODUCTS and equipment

Reply card on page 279 will bring you more information on any new products and equipment in this issue

Automatic Wire Prefeeder

. . . means even cut lengths

Users of large or heavy reels in wire measuring, cutting and stripping machine operations will find application for this automatic wire prefeeder. When large or heavy

rolls are used, pull of the wire during feeding stroke sometimes results in uneven cutting lengths, damaged insulation and excessive wear on machine. The prefeeder operates at a speed synchronized with the setting of the machine itself.

It is equipped with a scale for setting to the same reading as the scale on the stripping machine. Artos Engineering Co., Dept. ST, 2757 S. 28th St., Milwaukee 46, Wis.

FOR MORE DATA—CIRCLE REPLY CARD NO. 1

Mechanical Comparator

. . . for assembly line checking

Producto-Chek lightweight mechanical comparator makes it economical to apply advantageous comparator method to assembly line checking operations. Size settings can be made rapidly because of three adjustments. A lead screw on the column provides coarse adjustment and facilitates rapid rough positioning of the head. There are two fine adjustments: One, a thumb screw type, moves the gaging head slightly up or down; the other is a lever by which the dial scale is moved from left to

right for minute zeroing movements.

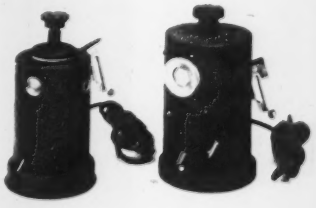
Gaging head features double reed amplifying system that obviates use of gear trains, levers, racks and pinions. DoAll Co., Dept. ST, 254 N. Laurel Ave., Des Plaines, Ill.

FOR MORE DATA—CIRCLE REPLY CARD NO. 2

Low Temperature Alloy Sprayers

. . . close texture control

Two low-temperature alloy sprayers, designed for close temperature and spray texture con-



trol, are electrically heated, self contained units. They have nickel-chrome heating elements and sensitive temperature controls. Air requirements are 3½ cfm at 35 to 75 pounds pressure.

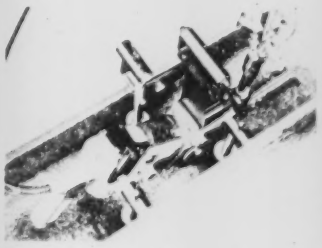
Both units can be used for intermittent or production spraying and incorporate crucible construction that insures closest balance of thermal relationships between thermostat, heating elements and heated mass. All parts are interchangeable. Alloys in billet, wire, rod or powder form can be handled. Forrester Co., Dept. ST, 895 29th Ave., San Francisco 14, Calif.

FOR MORE DATA—CIRCLE REPLY CARD NO. 3

Flame Cutting Machine

. . . straight cuts in I-beams

Model HP Cadet flame cutting machine is designed for making clean, accurate longitudinal cuts



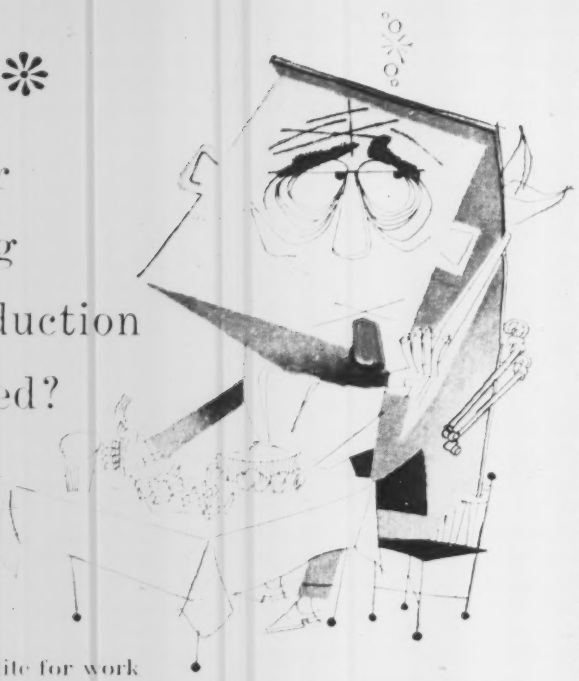
through webs of I-beams and wide flange beams. Guided by three lateral adjustable rollers, it makes straight longitudinal cuts from 5½ to 11¾ inches.

It can also be used for straight cuts or for cutting limited irregular shapes from plates. The machine is guided automatically by two fixed rollers running along a 1½ to 2½-inch steel strip or angle iron previously fastened to the plate. Speed of travel and gas flow to the torch are controlled by fingertip adjustments on the handle. Machine is adaptable for use with acetylene, propane or hy-

does

coil-itis*

have your processing tank production off its feed?



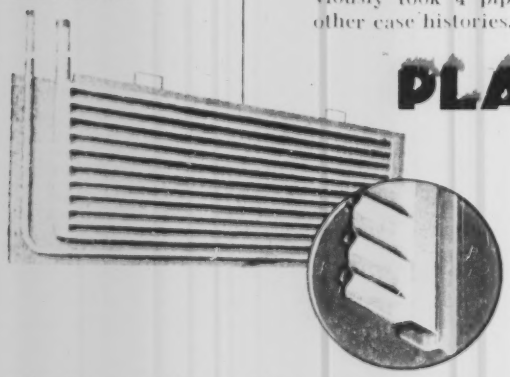
When the appetite for work of your heating and cooling processes diminishes, the trouble may well be coil-itis. For, downtime due to pipe failures and limitations can seriously delay your production flow. Switch to Platecoils, the new tonic for production, as revolutionary as the new wonder drugs. Platecoils take 50% less tank space leaving more room for greater payload. They heat or cool 50% faster. They simplify maintenance and save hours of downtime. Equally important, Platecoils cost as much as 50% less in the first place. Platecoils cure production troubles involving heat transfer and give production a shot in the arm.

Write for Bulletin P72 today!

PLATECOILS SAVE 50% IN HEAT TRANSFER COSTS

PLATECOILS ELIMINATE A 6-TO-8 HOUR-A-DAY CHIPPING JOB

At Sealed Power Corp., installation of Platecoils has completely eliminated a 6-to-8 hour-a-day chipping job. Three Platecoils now heat a tank that previously took 4 pipe coils. Ask about other case histories.



PLATECOIL

REPLACES PIPE COILS

Coil-itis — Diagnosed as tank heating and cooling problems. Platecoils — the prescription for solving pipe coil problems.

PLATECOIL DIVISION, TRANTER MANUFACTURING, inc., LANSING 4, MICHIGAN

NEW PRODUCTS and equipment

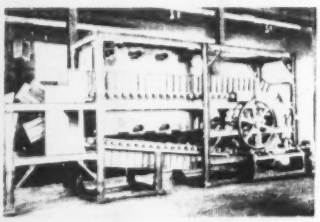
drogen gases. Weight of the entire machine, including guide rollers, is only 29 pounds for easy portability. American Pullmax Co. Inc., Dept. ST, 2455 N. Sheffield Ave., Chicago 14, Ill.

FOR MORE DATA—CIRCLE REPLY CARD NO. 4

Research Sintering Machine

. . . includes production features

Pilot sintering machines include all features of larger production machines, are capable of operation by down or up-draft, or in



combination. Gases can be recirculated either by pressure or suction for full heat recuperation or gas enrichment. Admission of free air can be controlled to meet process requirements.

Pallet sides are removable and can be furnished in varying heights to enable investigations under operating conditions involving several bed depths. Machine is designed for intermittent or continuous operation with equal output efficiency. Sintering Machinery Corp., Dept. ST, 316 Sinter Ave., Netcong, N. J.

FOR MORE DATA—CIRCLE REPLY CARD NO. 5

Multiple Clamping Device

. . . takes ten parts at once

This device clamps up to ten parts at once by compensating automatically for size differences. It provides a definite mechanical lock for parts that are hard or soft, regular or irregular in contour. Its compensaing equalizers can be

USE A REPLY CARD

Just circle the corresponding number of any item in this section for more information.

INFORMATION

AVAILABLE FOR THE ASKING

70. Air Motors

Ingersoll-Rand — "Air Motors Solve Tough Control and Drive Problems" is title of 12-page illustrated brochure 5072. It contains design and application data on series of multi-vane and piston type air motors. Specifications are given for motors with 1 10 to 24 hp and 21,000 to 19 rpm. Various accessories are shown.

71. Maintaining Floors

Multi-Clean Products, Inc. — Procedures for cleaning asphalt, concrete, terrazo, rubber, wood and linoleum flooring and operating information for various Multi-Clean floor machines are detailed in 40-page illustrated handbook No. 1000.

72. Rolling Mill Equipment

Morgan Engineering Co. — 36-page bulletin 16A contains illustrations of various pieces of rolling mill equipment, including blooming and roughing mills, tables and manipulators, slabbing, plate and universal mills, runout tables, three-high stands, vertical roll edger, etc.

73. Heavy Duty Cranes

Northern Engineering Works — Construction features of Northern Super-Cranes are to be found in 8-page illustrated bulletin SE-108. Various types of end trucks are shown, along with Super Trolleys. Clear vision cabs are featured.

74. Coolant Compound

Fiske Brothers Refining Co. — Magic Compound is a paste which, when properly dissolved in water, tends to cool, lubricate, impart a high finish to the product and lengthen tool life. As described in data sheet F5-252, it is suitable for use in milling, drilling, grinding, lathe turning, boring, broaching, threading and other operations.

75. Drill Pipe & Tool Joints

National Supply Co., Spang-Chalfant Div. Spangweld and Spang double seal shrink thread drill pipe and tool joints are subjects of 24-page bulletin No. 385. Well illustrated, it outlines problems of drill pipe use, steps for their solution and 17 rules for use and care of drill pipe. Four pages of tables give specs for available types and sizes.

76. Presses

Cleveland Crane & Engineering Co. — Bending, braking, punching, blanking, drawing and corrugating can be performed on Steelweld presses, subject of illustrated form 2010-F of 8 pages. Various models, construction features, specifications and feed, ram and die data are presented.

77. Soot Blowers

Continental Foundry & Machine Co., Copes-Vulcan Div. — Fifteen central station installations of Vulcan automatic sequential soot blower systems are discussed in 32-page illustrated bulletin 1004. Power and reheat boilers with capacities to 1,370,000 lb per hour and pressures to 1925 psi are included.

78. Work Gloves

C. Walker Jones Co. — Work gloves, gauntlets and work glove protectors are featured in 12-page illustrated catalog No. 25. Heat and abrasion resistant and other specialized cloths are shown by application photographs, as are the available styles and sizes for both men and women.

79. Shovel Cranes

Link-Belt Speeder Corp. — Crawler, truck and wheel-mounted shovel cranes of ¾-yard capacities are described in illustrated bulletin No. 2128. In addition to showing construction features of various models, working photographs are given and the fully hydraulic control system explained.

10-12-53

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80. Gear Speed Reducers

D. O. James Gear Mfg. Co. — 88 pages of engineering data and price-in catalog No. 17-B will assist in selection of proper gear reducer for specific power transmission problems. Subdivisions cover motorized gear speed reducers, motor reducers and gear speed reducers. Units come in [illegible] in ranges from [illegible] to 75 hp with ratios of 1.2:1 to 1200:1.

81. Friction Saws

Kling Bros. Engineering Works — Cutting capacities in cold steel and specification of high speed friction saws are featured in 4-page bulletin 9200. Standard equipment is described as well as such accessories as a centrifugal water pump and blade-dressing machine. Blades range in diameter from 24½ to 60 in.

82. Punch Presses

L & J Press Corp. — Plain flywheel and back geared open back inclinable punch presses are subject of illustrated form L-10. Identified as series 7, they have 80-ton capacities. Complete specifications, construction features and optional equipment are all detailed.

83. Broaching Machines

Lapointe Machine Tool Co. — Series HP horizontal broaching machines are subject of 6-page illustrated folder. Eight models have strokes ranging from 30 to 78 in. Dimensional drawings and complete specs are given, and such features as special hydraulic circuit and push-button control system briefly described.

84. Conveyor Systems

Allied Steel & Conveyors, Inc. — Some evidence of the diversity of Allied conveyors and materials handling systems is provided by 8-page catalog 953. Installations shown and described include combinations of various types of conveyors, multiple transferring operations and fully automatic complete materials handling systems.

85. Vacuum Cleaning

Lamson Corp., Billmyre Blower Div. — Diagrams and photographs help bulletin D-5 describe the Exidust central vacuum cleaning system for industry. Equipment consists of exhauster attached to permanently installed piping system which has connection where required for attaching conventional vacuum cleaning tools. Dusts are separated in multiple filters, and can be retained if desired.

86. Inserted Cutters

Ingersoll Milling Machine Co. — 72-page illustrated catalog No. 60V deals with inserted blade milling and boring cutters and includes data on carbide milling of steel, tool selection, cutting methods and cutter grinds. Ordering information is given on a full range of standard cutters.

EDITORIAL ARTICLES

Available in Limited Quantities

87. Type 430 Stainless

With nickel-bearing steel still on the defense list, type 430 stainless is passing outdoor corrosion tests with flying colors. One exception is severe marine atmospheres. Further data on 430's corrosion resistance is presented in STEEL article "430 Stainless Is Hardy Civilian" by A. H. Thomas, Chief Chemist, Armco Research Laboratories.

88. Batch Heat Treating

Job-lot heat treatment of different small parts and changing designs demand product and process flexibility. This can be realized by use of batch-type furnaces. Read STEEL article "Batch Heat Treating Is Versatile" by F. Crahen, Jack & Heintz metallurgical engineer.

89. Carbon Steel Bars

Part III of STEEL article "Guide for Selection of Carbon Steel Bars" by G. P. Witteman, Bethlehem Steel Co. metallurgical engineer, tells how grade and type of bar required can be determined by product specifications. Based on use requirements, bars can be reduced to 12 general product groups. These are given in three data sheets.

90. Gear Deburring

Yale & Towne Mfg. Co. has developed brush deburring of gears into a mass production method that saves more than 1000 hours a year on 17 parts alone. Setup employs brushing machine made by Osborn Mfg. Co. which is adapted to 129 different parts. Read STEEL article "Gear Deburring . . . Brush Setup Matches Production Pace," by W. J. Maund, Yale & Towne tool engineer.

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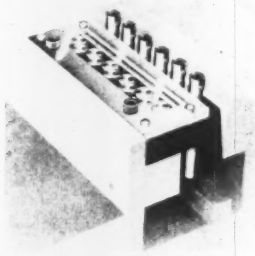
applied to all types of vises for milling, grinding, etc., and used as components of jigs and fixtures.

Separate sliding jaws one per workpiece in multiple machining



are backed up by a chamber of floating vertical rollers. These rollers shift position to exert equal pressure on each jaw. Jaws are held in the unit by a common key that permits sufficient movement in each for automatic individual takeup. Design Aids Co., Dept. ST, N. 7th St., Newark 7, N. J.

FOR MORE DATA—CIRCLE REPLY CARD NO. 6

Nonshrink Laminating Resins

. . . 100% solids content

Two nonshrink laminating resins are modified epoxy resins that have 100 per cent solids content and will not settle. Tests indicate both are

noncorrosive. Neither is brittle and both are easy to handle, apply and cure at room temperature.

Special facilities and equipment are not required. The resins are used primarily with glass cloth re-

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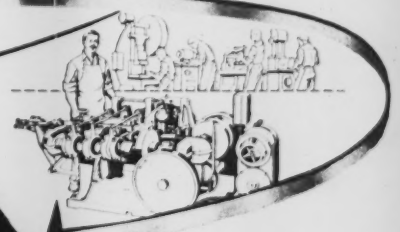
Save Labor



NILSON FOUR-SLIDE

Wire and Ribbon Metal FORMING MACHINES

Mounting production costs are driving firms out of the competitive picture. Too much scrap metal! Too many single operation machines! Too many operators! This whole picture can be changed to a highly profitable operation. Install a NILSON combination press and 4-Slide forming machine. This machine takes wire or ribbon metal directly from the coil, straightens, feeds, pierces, blanks, swages, stamps, or coins, cuts off and forms . . . automatically in one quick precise operation. See the new picture? . . . Increased production! Minimum scrap metal! One machine for all operations! One operator!

For specific recommendations . . . send details of your operation.

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NILSON has been specializing in Forming Equipment for over 50 years.

THE A. H. NILSON MACHINE COMPANY

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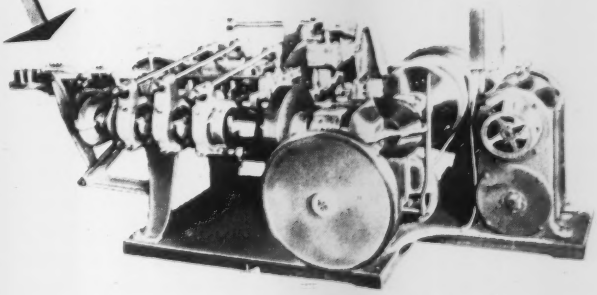


PRECISION

TO LESS THAN .0005 INCH

on H & S worms and worm gears

• Checking an H & S Worm & Gear on a precision inspection fixture for accuracy to less than .0005" on both indexing and lead...an accuracy that insures perfect thread contour and balance. These exceedingly close limits are obtained by the company's use of its own exclusively designed grinding machines. It's precision in manufacturing that insures higher efficiency, longer life and quieter operation. Yet this extreme precision is only one of seven outstanding features that are your guarantee of the finest worms and gears possible.

THE HORSBURGH & SCOTT CO.

GEARS AND SPEED REDUCERS

5112 HAMILTON AVE. • CLEVELAND 14, OHIO, U.S.A.

Send note on Company Letterhead for 488-Page Catalog 49

NEW PRODUCTS and equipment

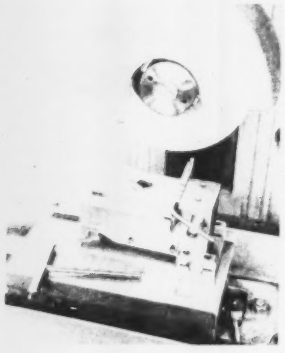
inforcing in such tooling applications as fabrication of jigs and fixtures, models, prototypes and tool masters. Rezoline Inc., 5736 W. 96th St., Los Angeles 45, Calif.

FOR MORE DATA—CIRCLE REPLY CARD NO. 7

Workholding Device

. . . holds tapered workpieces

Vise designed for precision grinding has adjustable stop and downholding feature that produce accurate workpiece positioning.



Clamping jaw swivels to allow holding of tapered and odd-shaped workpieces. It holds round stock from 1/16 inch to 2½ inches diameter in v-block fashion.

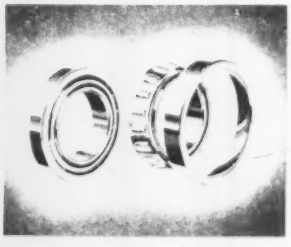
Jaw is attachable to angle plates, v-block and sine angle plates with 0.100-inch recess for small angles. Range of jaw opening is 0 to 3 inches. J & S Tool Co. Inc., Dept. ST, 644 W. Mt. Pleasant Ave., Livingston, N. J.

FOR MORE DATA—CIRCLE REPLY CARD NO. 8

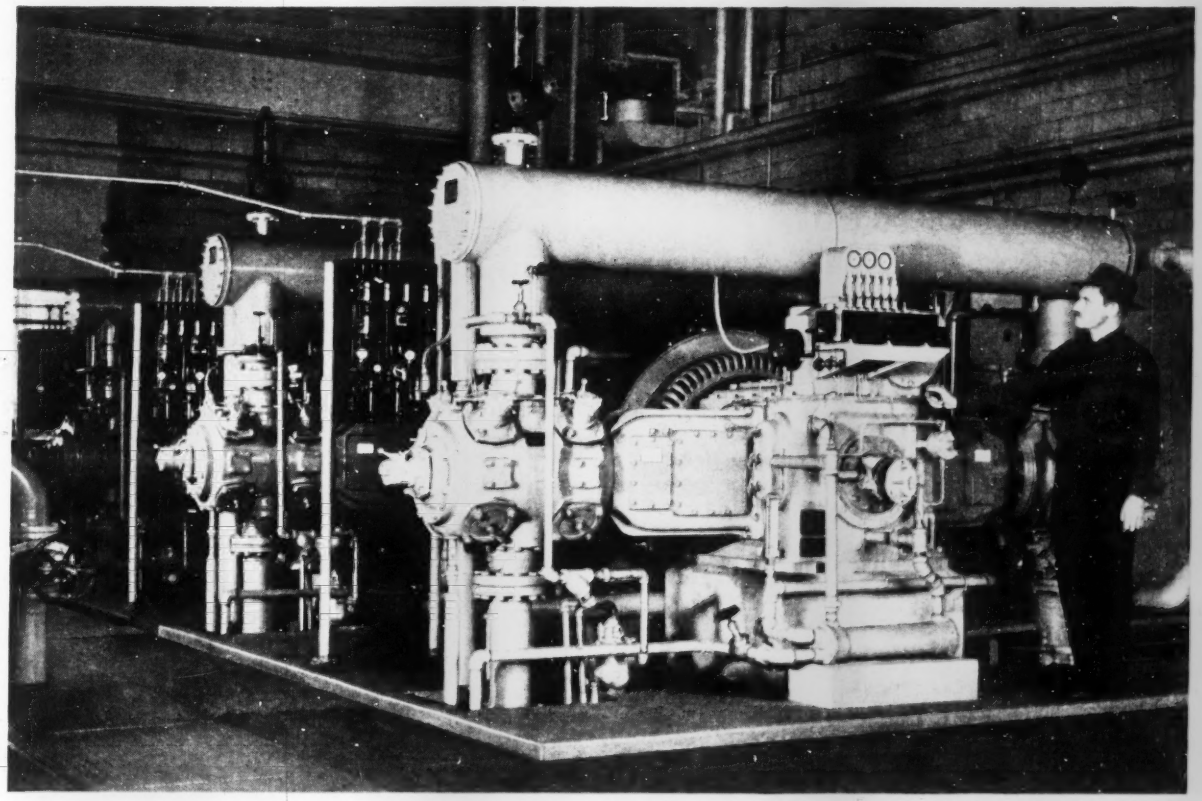
Barrel Bearing

. . . takes radial, thrust loads

Manufacturer is making its self-aligning barrel bearing available in volume quantities for general



industrial application. Accurately-ground barrel-shaped rollers, combined with precise race contours,



Compact, totally enclosed Clark Compressors cut space and building costs in Packard's Jet Engine Power Plant

Compressed air for all manufacturing operations in Packard Motor Company's new jet engine plant, Utica, Michigan, is furnished by three Clark 200 hp Balanced/Opposed Motor Driven Compressors.

Because of their totally enclosed, dust-proof design, Packard was able to install the units directly behind the boilers, with no partition wall between. Floor-space requirements and building costs were thus reduced.

By selecting the compact Clark CMA-2, Packard was able to provide the flexibility of a three-unit installation, within an exceptionally small space, to meet varying plant air demands.

For *any* industrial air compressor applications in the 150-4500 hp range — compact, vibrationless Clark Balanced/Opposed Compressors are your most practical answer. Complete information is in Bulletin 118, available on request!

CLARK BROS. CO. • OLEAN, N. Y.

Division of Dresser Operations, Inc.

Sales Offices in Principal Cities Throughout the World

PRECISION BY THE TON **CLARK** **balanced/opposed compressors**

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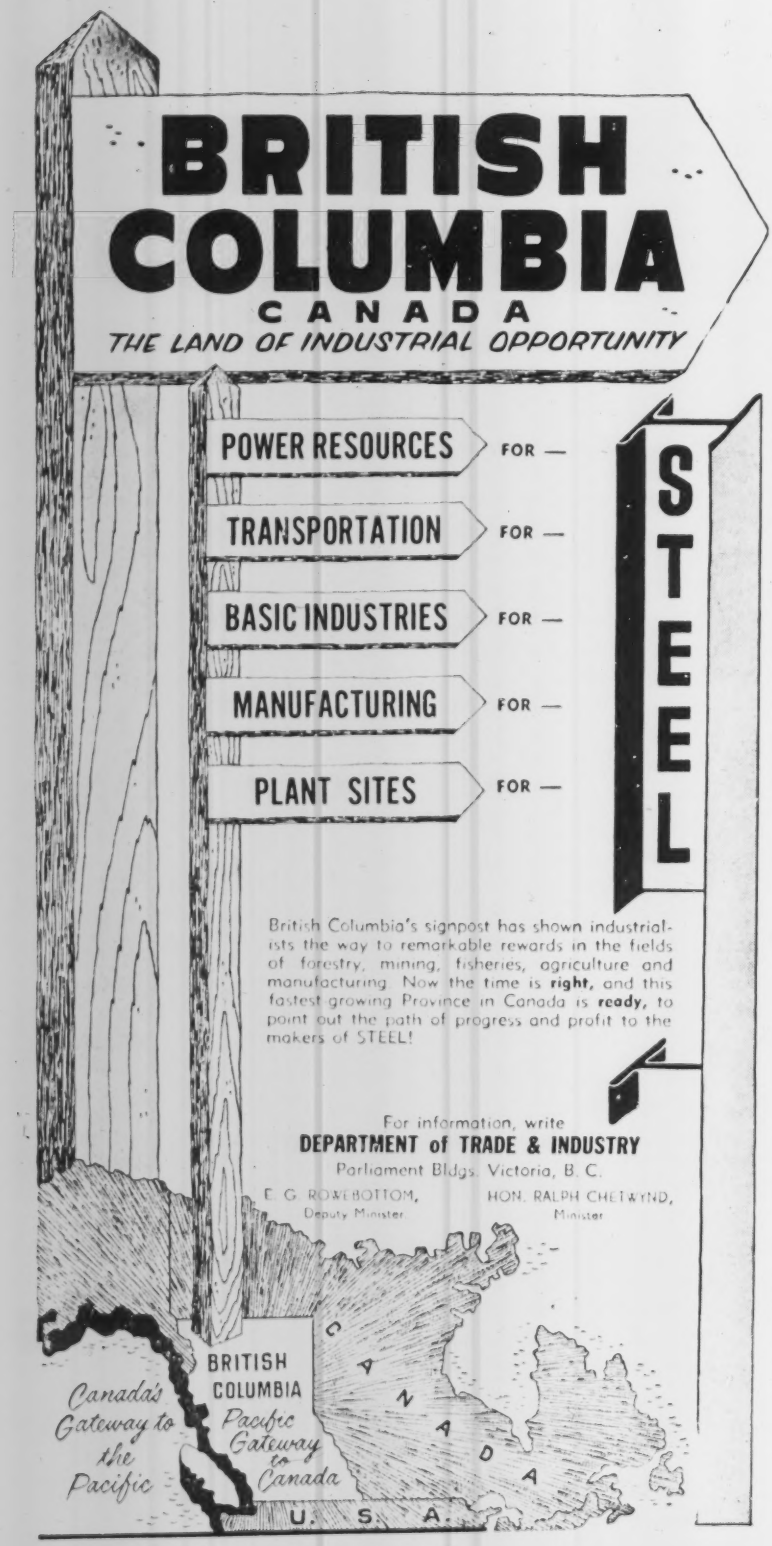


NEW PRODUCTS and equipment

provide maximum load carrying capacity throughout a wide range of operating conditions.

These angular contact bearings are designed to sustain radial, thrust or combination loads and are freely self-aligning. Conditions of shaft misalignment do not interfere with their operation. Hyatt Bearings Division, General Motors Corp., Dept. ST, Harrison, N. J.

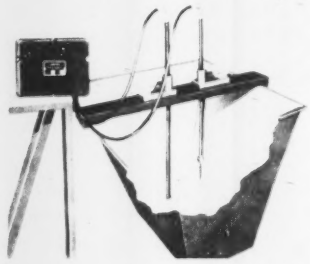
FOR MORE DATA—CIRCLE REPLY CARD NO. 9

Foundry Sand Distributor

. . . positive-level distribution

Automatic positive-level distribution of foundry sand from a belt to several hoppers or bins can be accomplished by this Hoppertrol controller. The unit controls air-operated plows according to the amount of sand in the hopper.

Design holds to a minimum wear



on the belt, plows and operating part. Sand level is maintained between two adjustable probes. Electronic units on each hopper are interlocked to operate plows one at a time in a selected order or preference. Harry W. Dietert Co., Dept. ST, 9330 Roselawn Ave., Detroit 4, Mich.

FOR MORE DATA—CIRCLE REPLY CARD NO. 10

Wire Straightener and Cutoff

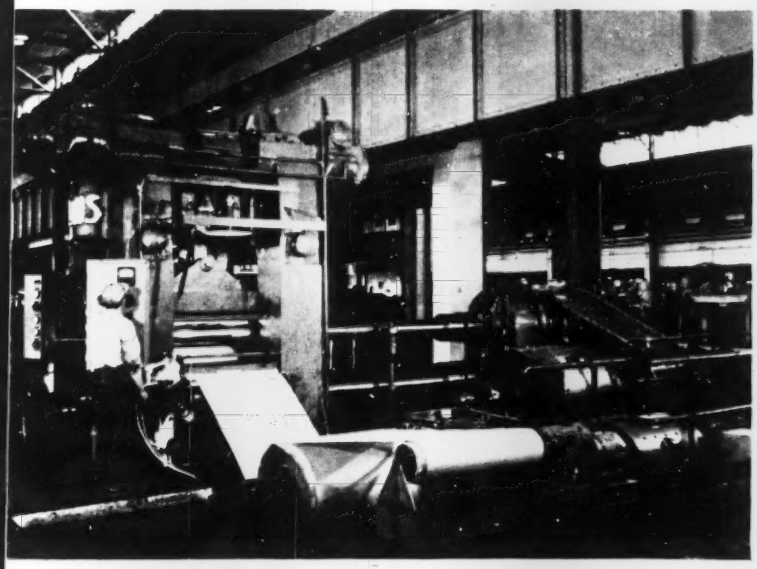
. . . adjusts from 100 to 225 fpm

Supermatic wire straightener and cutoff machine is equipped with infinitely variable all-hydraulic drive. Machine's throughput can be adjusted from 100 fpm to a continuous running speed of 225 fpm, with intermittent duty at 250 fpm.

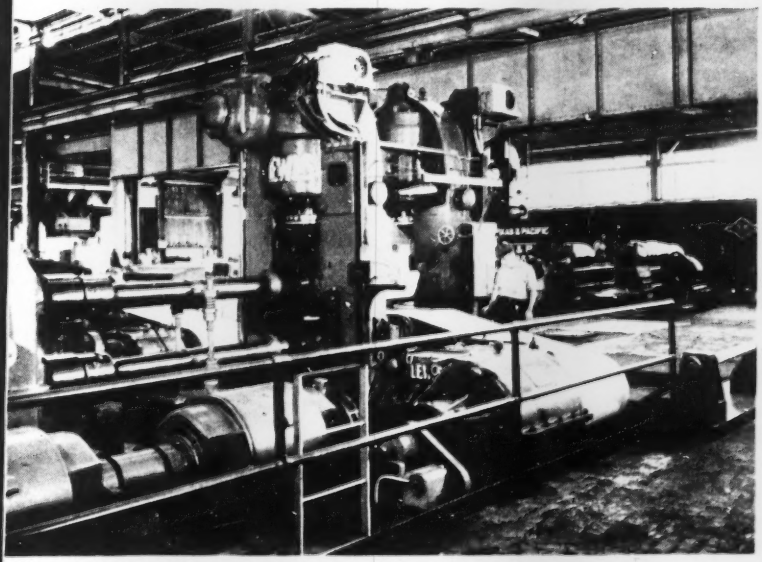
Hydraulic drive features instant starting and stopping. Machine will go from full speed forward to full reverse instantaneously due to hydraulic circuits.

Shear is completely hydraulic in

"It's a real 'bonus' maker"



Entry side showing unwinder and paper reel



Exit side showing winder and paper reel

That's the expressed opinion of roll bosses who have noted the high productive capacity and extreme accuracy of gauge of the new

28" x 42" TWO-HIGH

LEWIS

SKIN PASS

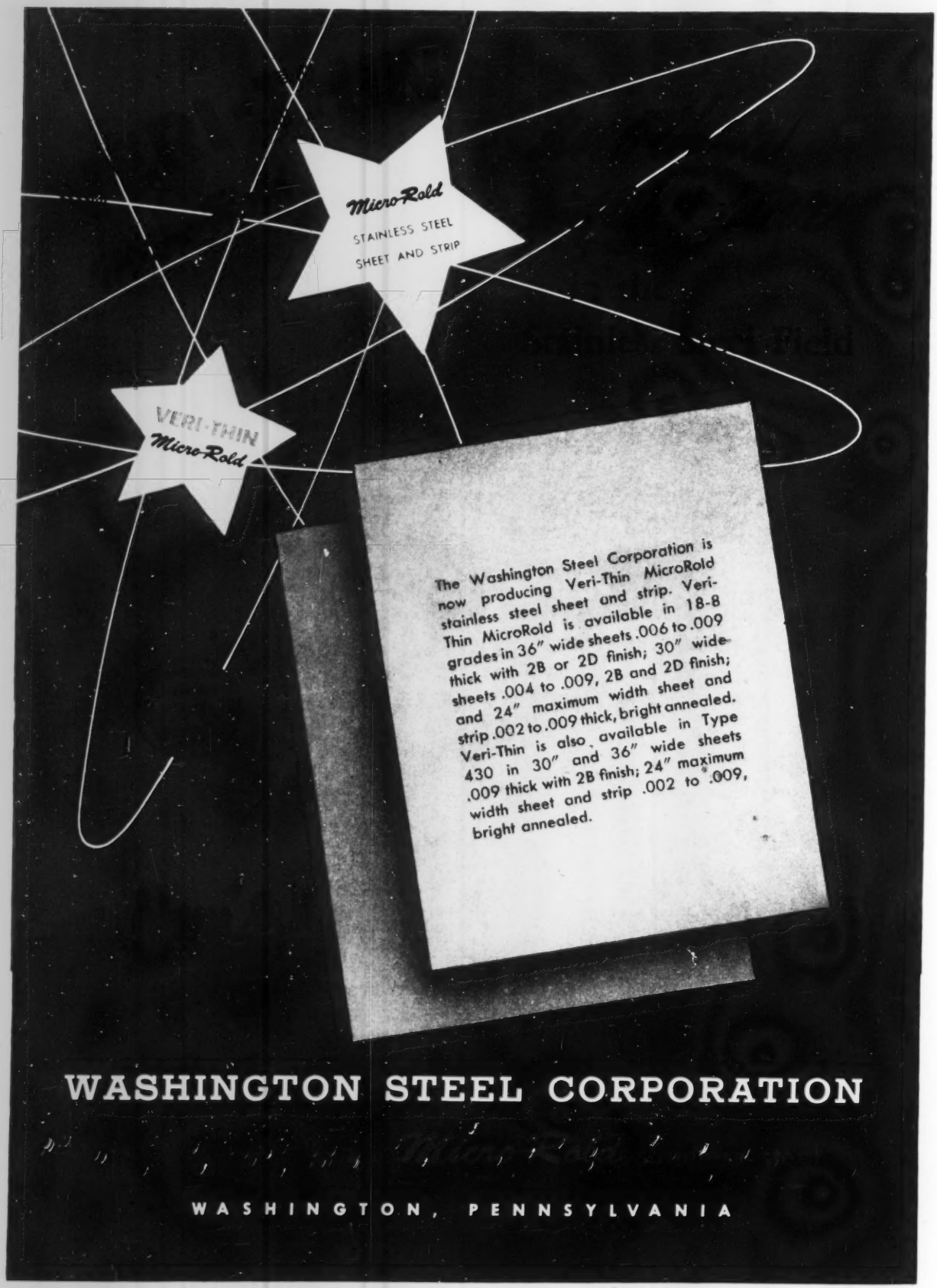
MILL

Like all Lewis equipment, this efficient mill was designed by experienced engineers who know the problems of both owners and operators. If your operation also could profit from this high-speed finisher we would be pleased to discuss details.

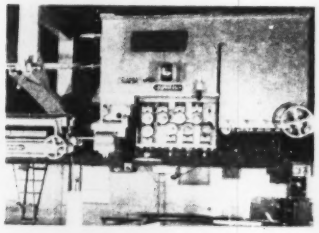
BLAW-KNOX

BLAW-KNOX COMPANY
LEWIS MACHINERY DIVISION
PITTSBURGH 22, PA.

BLAW-KNOX


MicroRold
STAINLESS STEEL
SHEET AND STRIP
VERI-THIN
MicroRold
The Washington Steel Corporation is now producing Veri-Thin MicroRold stainless steel sheet and strip. Veri-Thin MicroRold is available in 18-8 grades in 36" wide sheets .006 to .009 thick with 2B or 2D finish; 30" wide sheets .004 to .009, 2B and 2D finish; and 24" maximum width sheet and strip .002 to .009 thick, bright annealed. Veri-Thin is also available in Type 430 in 30" and 36" wide sheets .009 thick with 2B finish; 24" maximum width sheet and strip .002 to .009, bright annealed.
WASHINGTON STEEL CORPORATION
WASHINGTON, PENNSYLVANIA

operation, actuated by electric device that can be set for a predetermined cut length. All rolls are adjustable to assure proper centerline



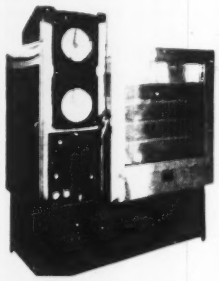
pass. Machine delivers a finished 12-foot long wire every $3\frac{1}{4}$ seconds. Medart Co., Dept. ST, 3535 DeKalb St., St. Louis 18, Mo.

FOR MORE DATA—CIRCLE REPLY CARD NO. 11

Atmosphere Control Cabinet

. . . limits: −20 to +200 F

Model 15-CF atmosphere control cabinet is redesigned for any type of moisture-vapor testing within limits of minus 20° F to plus 200° F, with relative humidity of 18 per



cent to slightly under 100 per cent.

This type of cabinet is used primarily for testing all types of packaging materials, tools, or metallurgical samples that may be affected by temperature or humidity. Package Materials Laboratories Inc., Dept. ST, 461 Crescent Rd., Hatboro, Pa.

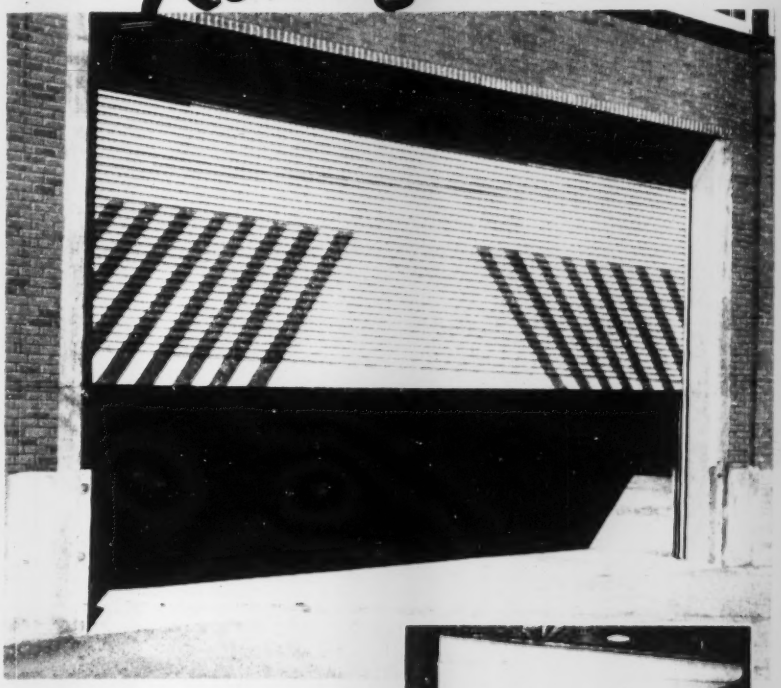
FOR MORE DATA—CIRCLE REPLY CARD NO. 12

Wear-Resistant Floor Surface

. . . over concrete, wood or brick

Metile floor provides a wear-resistant surface suitable for use in areas subjected to the most severe type of hard industrial operation. It consists of steel plates of about 1 sq ft embedded in specially-installed concrete. The plate is constructed so numerous anchorage

KINNEAR Rolling Doors



Greater Efficiency

SAVES

Time, Space, and Money

Every Kinnear Door is tailored to fit the individual opening, in old or new buildings. Coiling neatly above the lintel, they open straight up — can't interfere with traffic or other plant activity. A half-century of use under the most difficult conditions gives complete proof of the Kinnear Door's capacity for years of hard, constant service.

They save money because their rugged, all-steel, interlocking slat curtain assures long life and low maintenance costs, plus *extra* protection against fire, intrusion, or wind damage. Slat surfaces are heavily zinc coated by the hot-dip process,—and a special Kinnear Paint Bond is applied to assure lasting paint adhesion.

They save space by opening straight up and coiling above the doorway, allowing all floor and wall space around the door to be used at all times.

They save time with their smooth, easy, gliding action. With motor operation, doors can be fully and safely controlled by push-buttons from any number of convenient locations.

Write for your copy of new catalog.

The KINNEAR Manufacturing Company

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Columbus 16, Ohio
1724 Yosemite Ave.
San Francisco 24, Calif.
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KINNEAR
ROLLING DOORS

where precision counts

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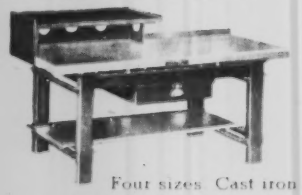
Challenge Work Benches . . .



Four sizes. Cast iron top, two inches thick. Welded steel supports, tool box shelf, steel drawer with lock.

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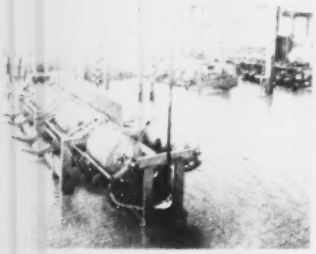
Full address

NEW PRODUCTS and equipment

points secure it to the concrete and prevent buckling or movement in either vertical or horizontal directions.

Floors are equally suitable for surfacing over new or old concrete,



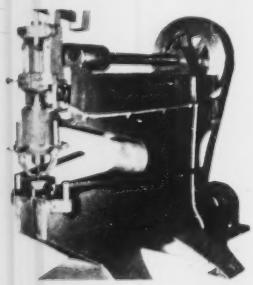
sound wood bases, wood block or brick. Design permits small protected islands of the concrete bedment to surface and form an effective nonskid pattern. Flash-Stone Co., Dept. ST, 3723 Pulaski Ave., Philadelphia 40, Pa.

FOR MORE DATA—CIRCLE REPLY CARD NO. 13

Alloy-Cutting Nibblers

. . . cut without distortion

Turret head nibblers cut almost all alloys without distortion. Cutting accuracy applies for shapes from high alloys to $\frac{1}{2}$-inch thick and milder alloys to 1 inch.



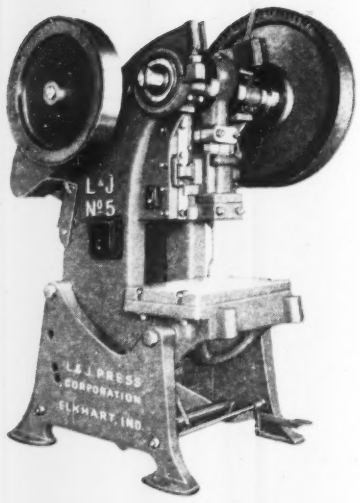
Although the machine is designed primarily to nibble, it also will shear where reasonable amount of distortion is not a factor. Tabor-Gray Mfg. Co., Dept. ST, 6225 Tacony St., Philadelphia 35, Pa.

FOR MORE DATA—CIRCLE REPLY CARD NO. 14

Improved Ingot Mold Coating

. . . gains blister-free coat

An improved ingot mold coating, called Masonoid 8-C4-FL, can be applied over a wide range of mold surface temperatures to gain complete blister-free coat of good



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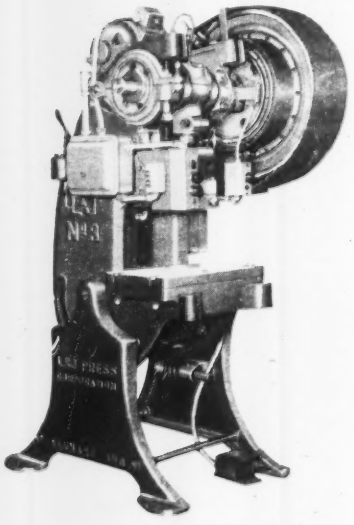
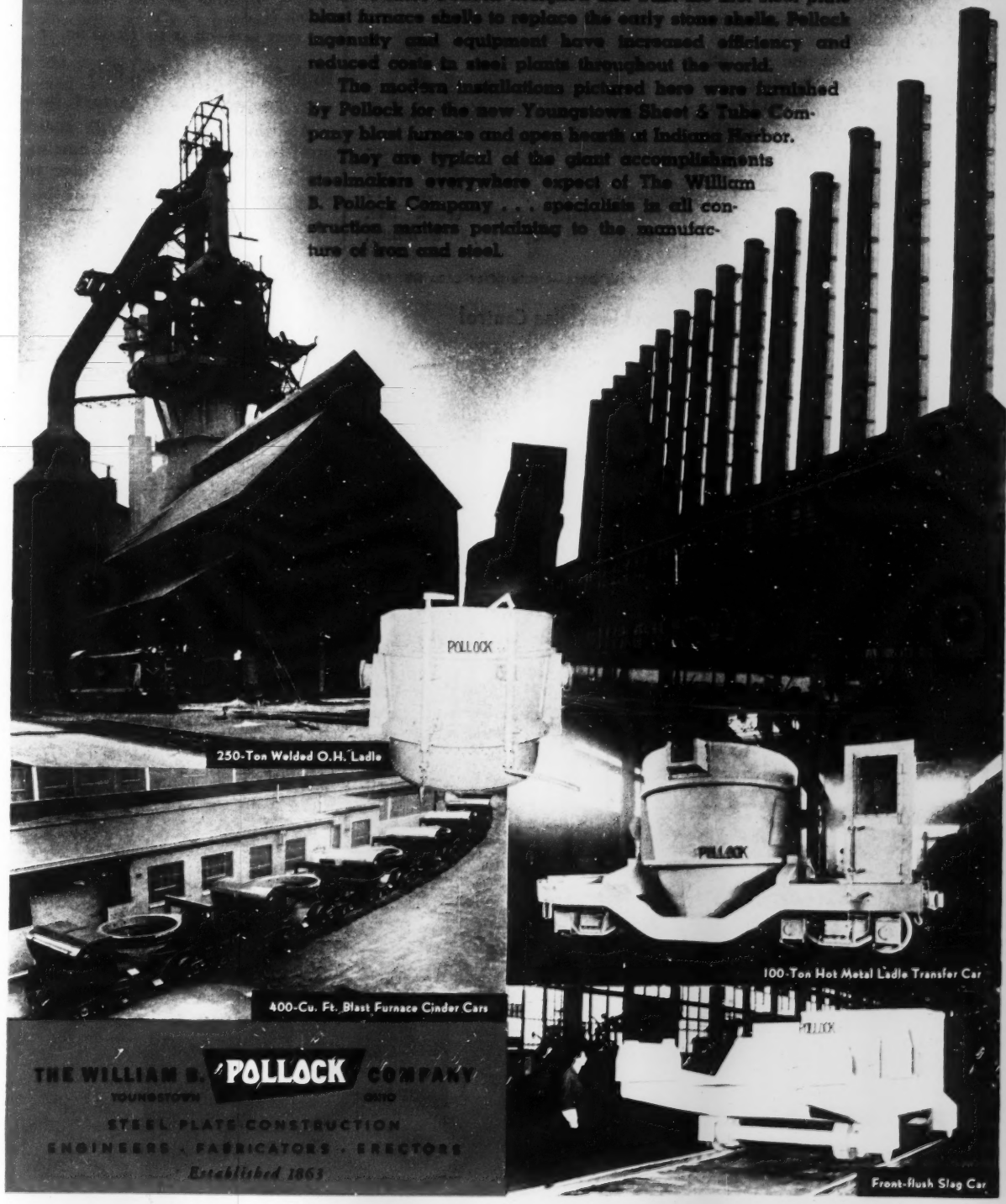


POLLOCK'S *Economic Impact in the Steel Industry*

Ever since Pollock designed and built the first steel plate blast furnace shells to replace the early stone shells, Pollock ingenuity and equipment have increased efficiency and reduced costs in steel plants throughout the world.

The modern installations pictured here were furnished by Pollock for the new Youngstown Sheet & Tube Company blast furnace and open hearth at Indiana Harbor.

They are typical of the giant accomplishments steelmakers everywhere expect of The William B. Pollock Company . . . specialists in all construction matters pertaining to the manufacture of iron and steel.



THE WILLIAM B. POLLOCK COMPANY
YOUNGSTOWN OHIO

STEEL PLATE CONSTRUCTION
ENGINEERS · FABRICATORS · ERECTORS
Established 1863

adherence. Experimental runs indicate the temperature range to be from room temperature to above 700 F. Manufacturer reports controlled burning and repelling of metal splashes are other characteristics.

A water soluble organic powder, the product is used in solutions up to 35 per cent solids and can be applied by dipping, flooding or spraying. Complete solubility in water and lack of foaming permit easy preparation. Odor is reported pleasant, vapor is nontoxic. Masonite Corp., Dept. ST, Chicago 90, Ill.

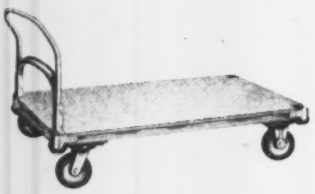
FOR MORE DATA—CIRCLE REPLY CARD NO. 15

Magnesium Platform Truck

. . . one-quarter less weight

All-magnesium, four-wheel platform truck is developed for general materials handling use. The truck is offered in ten mass-produced models, each weighing a reported one-quarter to one-third less than comparable standard equipment. All trucks in the series handle loads to 1000-pound capacity.

Handles are reversible and can be installed at either end of the



platform. They are also interchangeable, for replacement with special racks or superstructures to permit multi-purpose truck use. Magline Inc., Dept. ST, Pinconning, Mich.

FOR MORE DATA—CIRCLE REPLY CARD NO. 16

Machine Noise Control

. . . effective stopgap measure

Kling-Oil is a lubricating compound developed to correct vibration and noise in machines immediately until it is possible to replace worn gears that are the source of the trouble. A tacky oil, the product stays in place for extensive periods, does not drip or splatter.

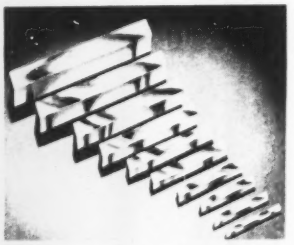
Generally, the oil is applicable to all lubrication operations where lube oil is used on a hand application basis. Magnus Chemical Co. Inc., Dept. ST, South Ave., Garwood, N. J.

FOR MORE DATA—CIRCLE REPLY CARD NO. 17

High-Speed Steel Tool Bits

. . . square from 3/16 to 1 inch

Addition of ground high speed steel tool bits to its line of cutting tools enables the manufacturer to



provide finish-ground bits in ten sizes of squares from 3/16 to 1 inch. Bits are accurately ground

MAY-FRAN
HINGED-STEEL CONVEYOR BELTS

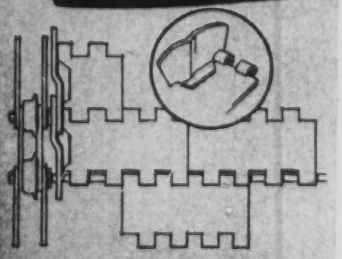
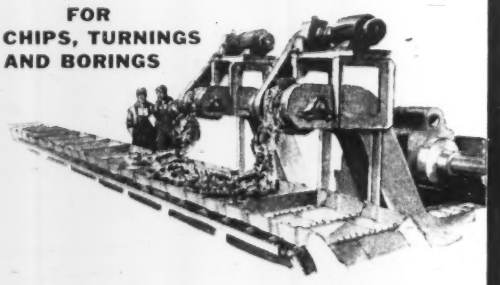
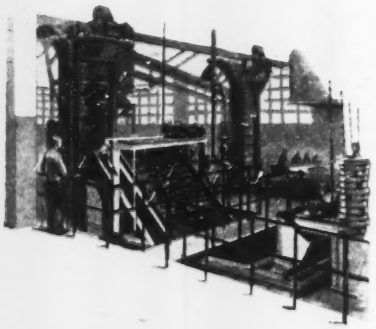


Diagram shows assembly of links, rollers, chain and side wings.

FOR CHIPS, TURNINGS AND BORINGS



FOR MASS-PRODUCED PARTS



to 0.001-inch for ease in alignment.

Made from a molybdenum-tungsten alloy, the bits have good red hardness characteristics, resistance to abrasion and excellent toughness. These factors, plus a full-length tool bit, indicate good general purpose performance on a wide variety of metals and at a broad range of cutting speeds. Besly-Welles Corp., Dept. ST, Beloit, Wis.

FOR MORE DATA—CIRCLE REPLY CARD NO 18

Quick Preheating Electrode

. . . source of instant heat

For uses where an acetylene torch is impractical or impossible, this ThermoTrode electrode serves as a source of instant heat. No special equipment is necessary. The product is inserted in an ordinary electrode holder of a direct current arc welder and is ready to function.

Steel core electrode features a specially-developed flux that establishes a unique type of arc. Instead of depositing the metal, it oxidizes with a searing blast so the

core metal disintegrates into a powder that can be brushed off easily. Eutectic Welding Alloys Corp., Dept. ST, 40-40 172 St., Flushing, N. Y.

FOR MORE DATA—CIRCLE REPLY CARD NO 19

Communications System

. . . runs on one 6-v battery

Telephone-type intercommunications system, called Duo-Com, ties together separate business and industrial functions. The simplified two-phone system provides instant natural voice communication, will operate more than a year on a single 6-v battery.

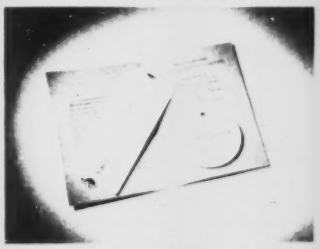
Contact between phones is made simply by lifting the receiver and depressing a button no dialing, switchboard or press-to-talk keys. RCA Victor Division, Radio Corp. of America, Dept. ST, Camden, N.J.

FOR MORE DATA—CIRCLE REPLY CARD NO 20

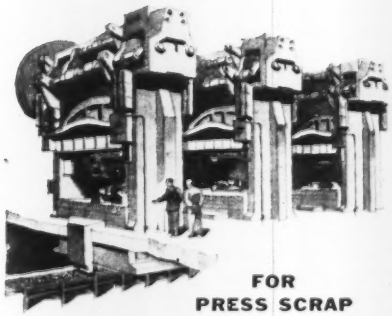
Fluid Selector

. . . for all machining operations

This cutting and grinding fluid selector helps determine which fluids can be used for various machining operations. Every common machining operation for steel, stainless steel, magnesium, brass,



bronze, copper, aluminum and monel is given, along with machinabil-



FOR PRESS SCRAP

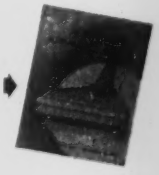
Speed up your production with a MAY-FRAN automatic handling system.

CHIPS, TURNINGS AND BORINGS are continuously and automatically removed from operating machine tools with MAY-FRAN CHIP-TOTES. These outstanding units speed production by eliminating machine down-time for manual scrap removal. MAY-FRAN Conveyors can then transmit scrap to ultimate point of disposal.

PRESS SCRAP systems can be made completely automatic. MAY-FRAN Conveyors take scrap from presses, handle it through shearing and baling processes, and deliver it to railroad cars.

MASS PRODUCED PARTS can be handled automatically on MAY-FRAN Conveyors through heat treating, machining, inspection, and other operations with maximum trouble-free speed and efficiency.

Write today for detailed information



MAY-FRAN ENGINEERING, INC.

DESIGNERS AND BUILDERS OF COMPLETE HANDLING SYSTEMS

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HEAVY-DUTY *Air-Cooled* ENGINE POWER

at Its Best!

More than 500 manufacturers of mechanized machines used extensively in agricultural service, construction, materials handling, railway maintenance, mining, oil field service and many other types of heavy-duty power applications . . . specify Wisconsin Heavy-Duty Air-Cooled Engines as "original equipment". Experience has proved that this provides the best guarantee of dependable power performance and long engine life.

Power TO FIT THE JOB

Power TO FIT THE MACHINE

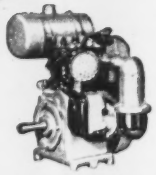
These machinery builders base their selections of Wisconsin Air-Cooled Engines on such factors as heavy-duty design and construction, low-cost operation and maintenance, foolproof AIR-COOLING, easy starting under all climatic conditions and readily available factory replacement parts and service at all times, through a solidly established, dependable source.

Of prime interest, also, is the fact that Wisconsin Engines, because of their relatively light weight and compact design, can be fitted into your equipment without costly re-designing of the machine itself. Wisconsin Motor engineering service is always available to assist the original equipment manufacturer in utilizing to the fullest the *power* and *design advantages* of Wisconsin components.

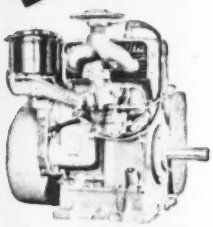
The Wisconsin line provides, further, a broad choice of 4-cycle engines from 3 to 36 hp., in single and multi-cylinder models as briefed on this page—*power to fit both the Machine and the Job.* In addition, the WISCONSIN name assures popular recognition and reputability to match your own if you are a leader in your field.

4-CYCLE SINGLE CYLINDER 3 to 9 hp.

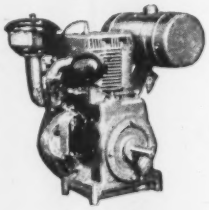
MULTI-CYLINDER 7 to 36 hp.



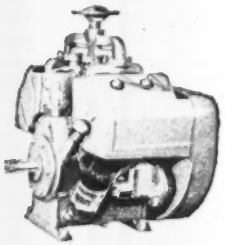
Model ABN, AKN
3 to 6 hp.



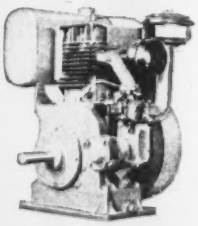
2-cylinder Models TE, TF
7.2 to 14.6 hp.



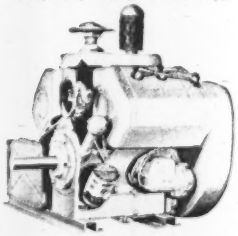
Model AEN
4.5 to 8.2 hp.



V type 4-cylinder Models
VE4, VF4, VP4D, 15 to 31 hp.



Models AFH, AGH, AHH
6 to 9.2 hp.



V type 4-cylinder
Model VG4D, 25 to 36 hp.

WISCONSIN MOTOR CORPORATION

World's Largest Builders of Heavy-Duty Air-Cooled Engines

MILWAUKEE 46, WISCONSIN

A-7505-1PC

NEW PRODUCTS and equipment

ity ratings of the various metals.

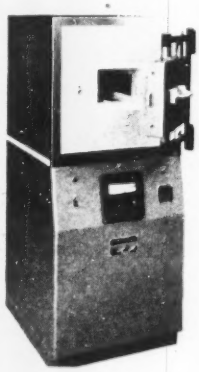
Instructions, plus rules of thumb to follow for using fluids are printed on the selector. D. A. Stuart Oil Co. Ltd., Dept. ST, 2727 S. Troy St., Chicago 23, Ill.

FOR MORE DATA—CIRCLE REPLY CARD NO. 21

Box-Type Heat Treater

. . . sizes to 10 x 8 x 18 inches

Series KR high - temperature electric box type heat treating furnace is built in five different sizes from 6 x 6 x 9 inches to 10 x 8 x 18 inches. Control instrument, as well as the transformer, is completely enclosed in a skirt cabinet on which the furnace proper rests. Heating elements are made of high-temperature alloy wire which is



reported nonscaling, nonflaking and almost impervious to attack from sulphur and its compounds.

Pilot light indicates when the furnace is in use; green or amber lights flash with action of the electric temperature controller. Furnace has an easy-to-operate double-pivoted plug type door and has multi-insulation to gain maximum heat retention. K. H. Huppert Co., Dept. ST, 6830-32 Cottage Grove Ave., Chicago 37, Ill.

FOR MORE DATA—CIRCLE REPLY CARD NO. 22

Drop Forged Chain

. . . flexible in four directions

Duraflex, a 2½-inch-pitch drop forged conveyor chain has ultimate strength of 37,500 pounds. Manufacturer reports it is considerably stronger than other similar pitch chains.

It is flexible in four directions, there are no riveted pins and it can

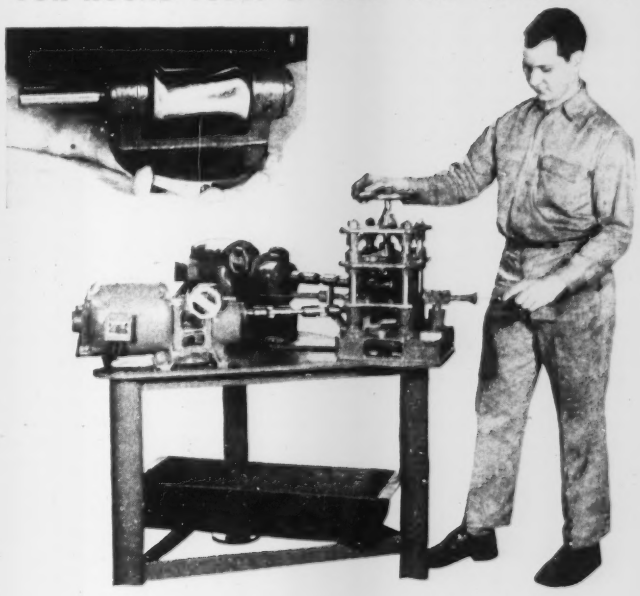
We Build Small Ones Too!

MEDART

No. 000 TWO-MOTOR TYPE

2-ROLL ROTARY STRAIGHTENER

FOR ROUND TUBES & BARS 1/16" TO 3/16" O. D.



- The smallest mill duty 2-roll rotary precision straightening machine made. Straightens, sizes, polishes and corrects out-of-roundness from end to end.
- Individual roll drive from variable speed motors equipped with integral speed reduction units, and interlocked for synchronization of roll speeds.
- Rolls made of Smavroc Alloy. Timken Bearing equipped.

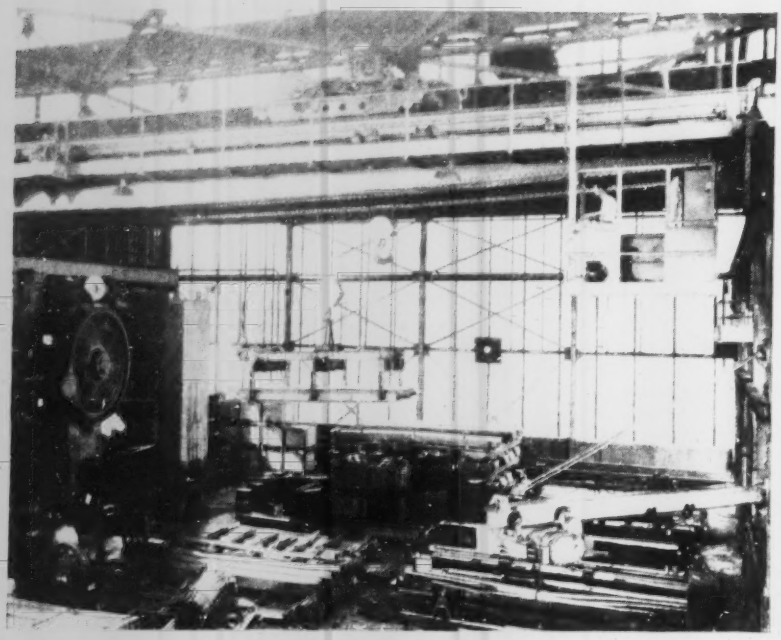
Large Or Small—Medart Builds Them!

2-Roll Rotary Straightening, Sizing & Polishing Machines for tubes and bars from 1/16" to 9" or larger or multiple-roll straighteners for pipe or thin-wall tubes up to 24". Whatever the straightening job, a Medart machine will do it *faster, better and at lower cost!*

Write For Catalogs

THE MEDART COMPANY 3535 DE KALB STREET ST. LOUIS 18, MISSOURI

SHEPARD NILES CRANE

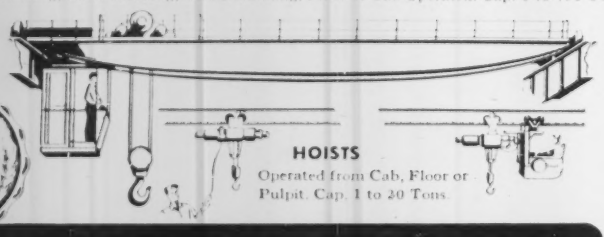


MOVES TONS of material with EASE...

With this Shepard Niles Crane, one man can move tons of material simply by flicking a switch. There's no wasted manpower, no floor or yard space lost—goods move swiftly by the most direct route.

It's easy to see why so many plants prefer low-cost through-the-air handling. But which crane is best for your use? Talk over this problem with the Shepard Niles representative—he's a specialist in loads through-the-air. Write today for Bulletin describing Shepard Niles Cranes—and ask to have a representative call.

CRANES
Overhead: Top Running, Inner Running, Under Running, Floor or Cab Operated. Cap. 1 to 450 Tons.



50th ANNIVERSARY
SHEPARD NILES CRANE & HOIST CORP.
1903 1953

HOISTS
Operated from Cab, Floor or Pulpit. Cap. 1 to 20 Tons

SHEPARD NILES
CRANE AND HOIST CORPORATION

2329 SCHUYLER AVENUE, MONTOUR FALLS, N.Y.

NEW PRODUCTS and equipment

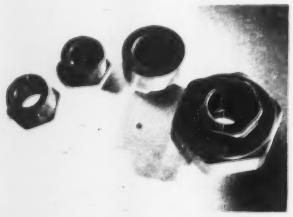
be assembled or disassembled without tools. Jervis B. Webb Co., Dept. ST, 8951 Alpine Ave., Detroit 4, Mich.

FOR MORE DATA—CIRCLE REPLY CARD NO. 23

Corrosive Liquids Fittings

. . . complete continuous system

Complete piping systems to handle corrosive liquids are practicable with addition of reducing bushings, plugs, unions and caps to the manufacturer's fitting line. Used with pipes and valves of unplasticized polyvinyl chloride, the



fittings of the same material make possible a continuous system for use in solving plant corrosion problems.

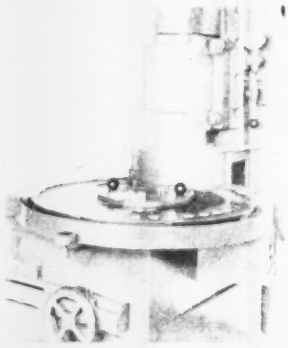
Fittings are made in standard IPS sizes. Material can be drawn, formed, molded, machined and welded by the hot air method. H. N. Hartwell & Son Inc., Dept. ST, Boston, Mass.

FOR MORE DATA—CIRCLE REPLY CARD NO. 24

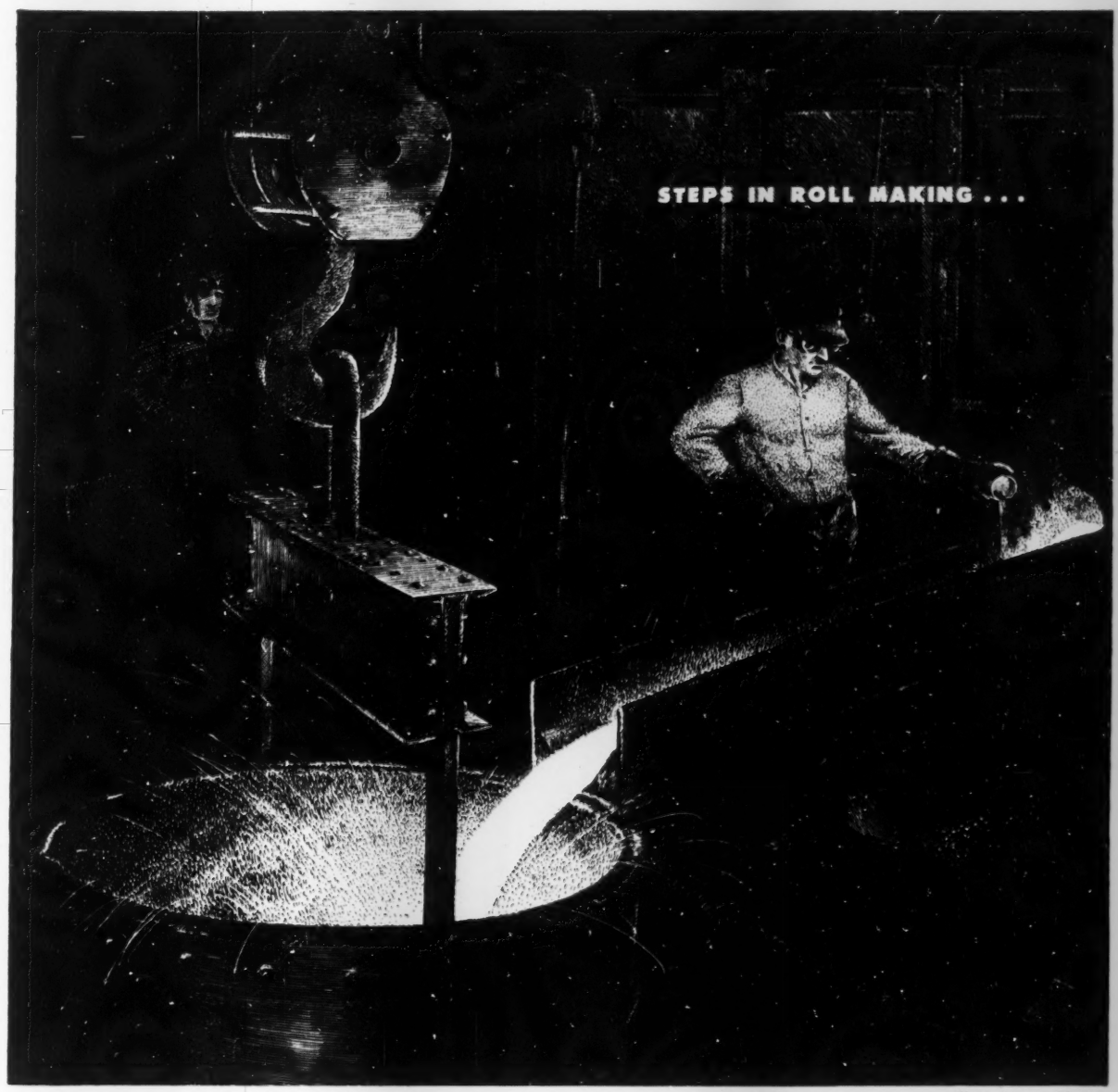
Vertical Spindle Grinder

. . . each slide has handwheel

Vertical column of this model 203, 15-inch grinder supports grinding heads upon vertical slides. Each head slide has a handwheel



and feed screw mechanism for raising and lowering. Steel tank for wet grinding system is set at one



Tapping a Heat

A GOOD MIXER

The skilled National Roll metallurgist mixes his batch according to formula, but he also knows through experience the extra ingredients to add to control roll strength, hardness or heat-resistance . . . and when the heat is tapped, it is a certainty that the batch is *right* to produce the roll specified. ● Careful attention to a multitude of details in every step in roll making here at National results in sound, long wearing iron and alloy iron rolls that will live up to your service expectations.

NATIONAL ROLLS

National Rolls

THE NATIONAL ROLL & FOUNDRY CO.

AVONMORE, PENNSYLVANIA

SPECIALISTS IN IRON AND ALLOY IRON ROLLS AND CASTINGS

"Automated"

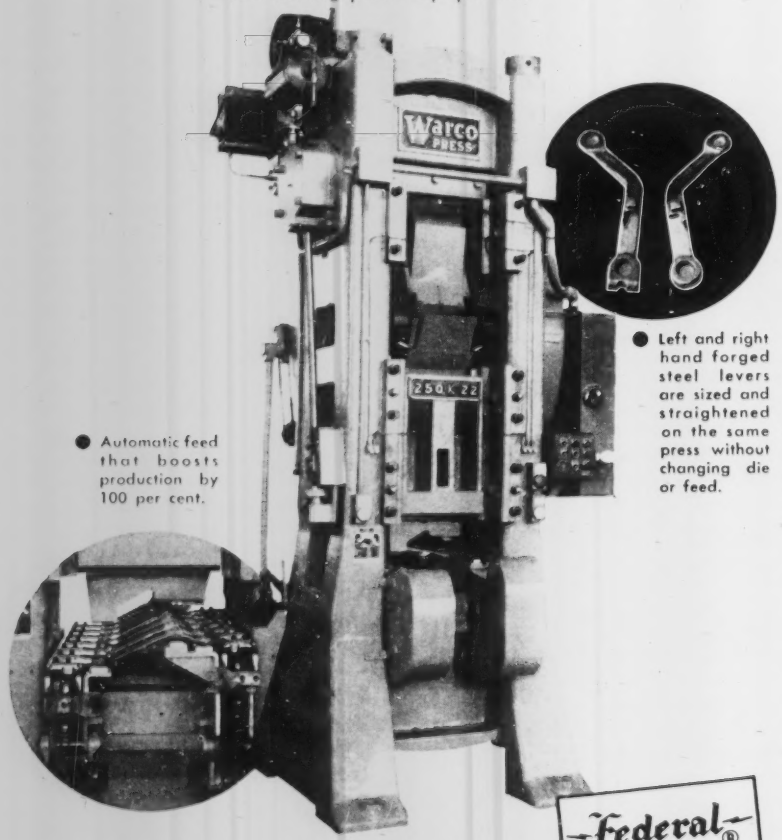
Warco®

Coining Press Slashes Sizing and Straightening Costs for Leading Automobile Builder

When a leading automobile manufacturer wanted to cut production costs on a forged steel lever Warco engineers worked with them in designing and building a 250-ton coining press with a chain type feed to automatically size and straighten the levers at a speed of 30 finished pieces per minute.

Front loaded, the press will size and straighten either left or right hand lever without change in dies or feed. It has reduced the production time of this part by more than one-half and has provided a safer, less fatiguing job for the operator.

Warco is constantly working out faster, less expensive and safer press production methods. Why not call them in the next time you are in the market for cost-cutting press equipment?



● Automatic feed that boosts production by 100 per cent.

● Left and right hand forged steel levers are sized and straightened on the same press without changing die or feed.

Federal® WELDERS

THE FEDERAL MACHINE & WELDER COMPANY

WARREN, OHIO

Warco PRESSES®

NEW PRODUCTS and equipment

side of the machine and collector trays divert coolant to this tank. A motor-driven pump circulates coolant to abrasive wheels through hollow spindles.

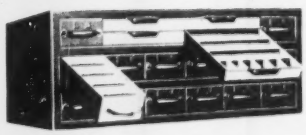
Rotary carrier for the insulators consists of a circular plate 3/32-inch thick, made of Celeron grade C, having openings placed near the periphery into which ceramic parts are placed. A quantity of parts is dumped onto the carrier and the operator slides these pieces into the carrier openings easily and rapidly. Gardner Machine Co., Dept. ST, Beloit, Wis.

FOR MORE DATA—CIRCLE REPLY CARD NO. 25

Steel Parts Cabinets

. . . office or plant storage

All-steel small parts cabinets are applicable for parts storage use in plants and offices. Cabinets consist of two 1½-inch high drawers in one-piece welded frame with overall size of 3¼ x 11 x 11 inches. Each drawer has eight dividers,



giving the cabinet a total of 24 adjustable compartments. By adding extra dividers it is possible to achieve 56 compartments per unit.

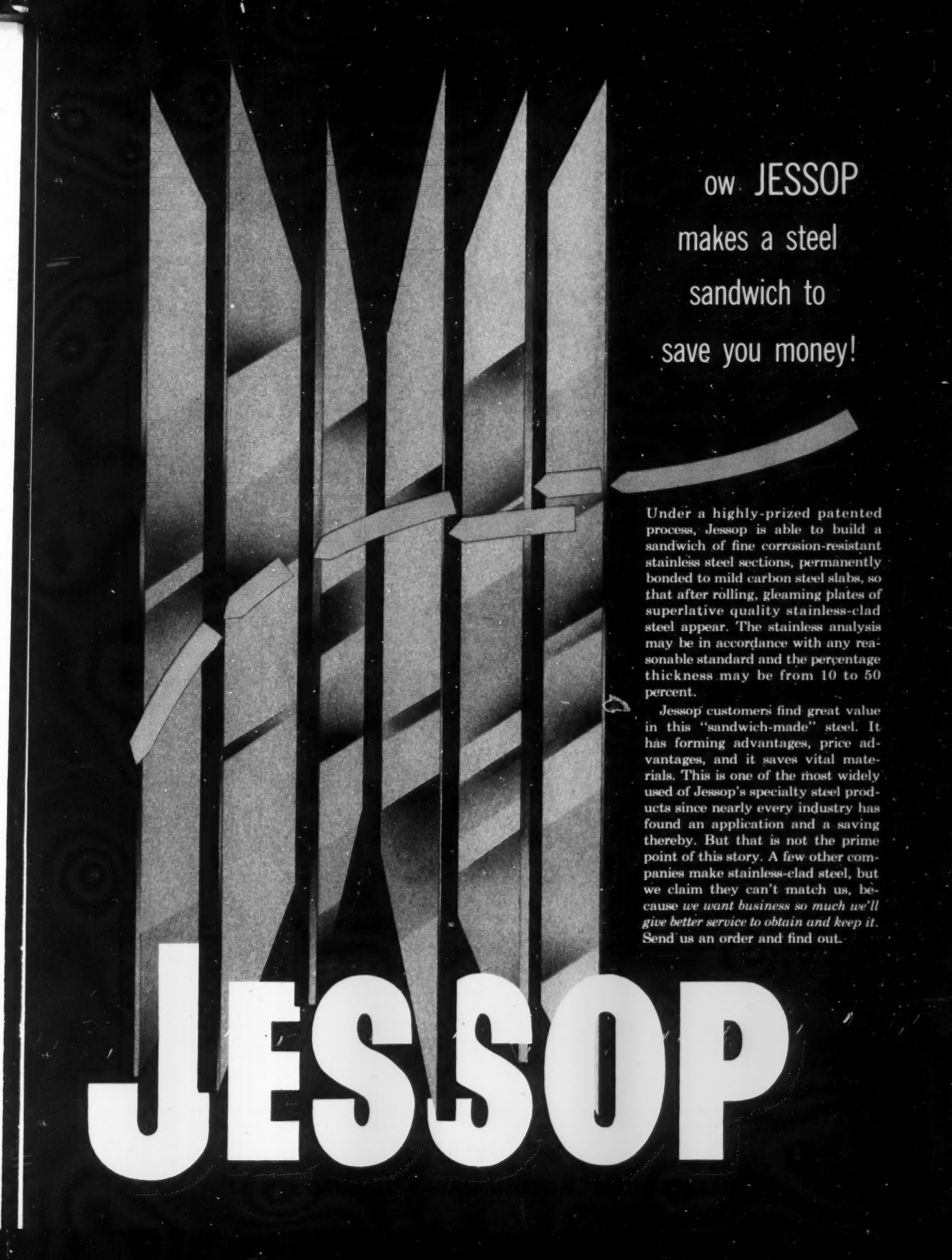
Tabs turn up and engage the shelf above to prevent tipping when used as an insert in shelving. Any number of units can be stacked in one solid assembly. Precision Equipment Co., Dept. ST, 3714 Milwaukee Ave., Chicago 41, Ill.

FOR MORE DATA—CIRCLE REPLY CARD NO. 26

Automatic Welding Machine

. . . high speeds on structurals

This versatile and simple automatic welding machine is developed to achieve production rates on welds on large structural parts. The unit is a fully automatic submerged-melt machine, incorporating a standard head. Base and track assembly is adjustable for fast alignment with work. Track

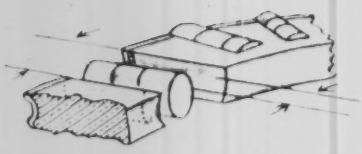

ow JESSOP
makes a steel
sandwich to
save you money!
Under a highly-prized patented process, Jessop is able to build a sandwich of fine corrosion-resistant stainless steel sections, permanently bonded to mild carbon steel slabs, so that after rolling, gleaming plates of superlative quality stainless-clad steel appear. The stainless analysis may be in accordance with any reasonable standard and the percentage thickness may be from 10 to 50 percent.
Jessop customers find great value in this "sandwich-made" steel. It has forming advantages, price advantages, and it saves vital materials. This is one of the most widely used of Jessop's specialty steel products since nearly every industry has found an application and a saving thereby. But that is not the prime point of this story. A few other companies make stainless-clad steel, but we claim they can't match us, because *we want business so much we'll give better service to obtain and keep it.* Send us an order and find out.
JESSOP

Why Rollway's Right-Angle Design increases

BEARING RELIABILITY

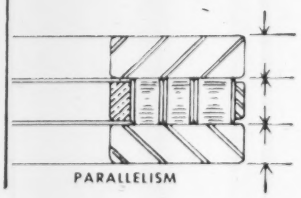
In a Rollway Thrust Bearing the rollers are precision machined to uniform cross-section . . . thrust plates are held to extremely close limits of parallelism. As a result, there's no skewing effect; no wedging of the rollers. Wearback of roller ends is held to a minimum.

That's why, in any given dimensional limit, Rollway Thrust Bearings give you more efficient, heavy-duty service and increased bearing life.



PARALLELISM

Accurate parallelism between the rollers and the matched thrust plates is repeated in the parallelism between the separator slots and the rollers themselves—all adding up to quiet, smooth rolling.



PARALLELISM

Rollway Thrust Bearings offer the widest selection in types and sizes, available for quick replacement through Authorized Distributors. See your classified 'phone directory for name.

Our engineers are available to help you select the correct Rollway Bearing for your needs. No cost or obligation. Contact your nearest Rollway sales office.

Rollway Bearing Company, Inc., Syracuse 4, N. Y.

SALES OFFICES

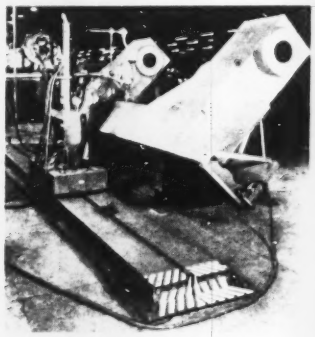
Syracuse
Cleveland
Pittsburgh
Boston
Philadelphia
Toronto
Los Angeles
Houston
Chicago
Milwaukee
Detroit

ROLLWAY®
BEARINGS

Complete Line of Radial and Thrust Cylindrical Roller Bearings

sections can be added for welding longer workpieces.

Head position is adjustable vertically and laterally on the carriage and angular positions are provided by hinging the welding head on the



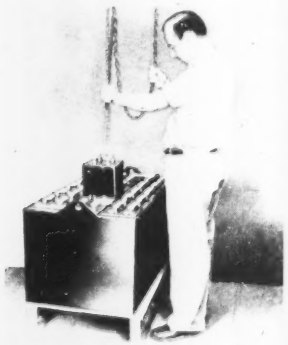
end of the horizontal supporting arm. Weld speed is controlled by varying carriage speed. Manufacturer reports its machine multiplies volume of work of a man with manual welding arc about four times. National Supply Co., Dept. ST, Torrance, Calif.

FOR MORE DATA—CIRCLE REPLY CARD NO. 27

Battery Cell Puller

. . . speeds examination, repair

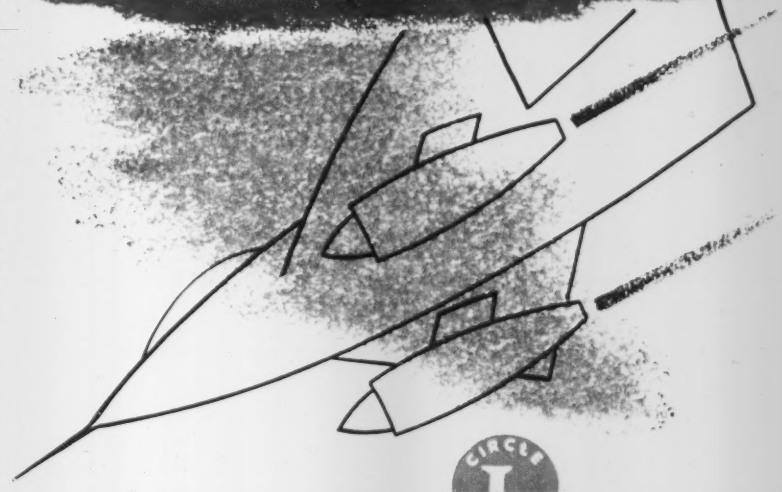
Users of industrial storage batteries will find this cell-puller useful for removing cells for examination or repair. The tool, generally used in sets of two, consists



of a U-shaped steel loop brazed to a hexagonal steel nut with specially-cut threads tapering from bottom to top.

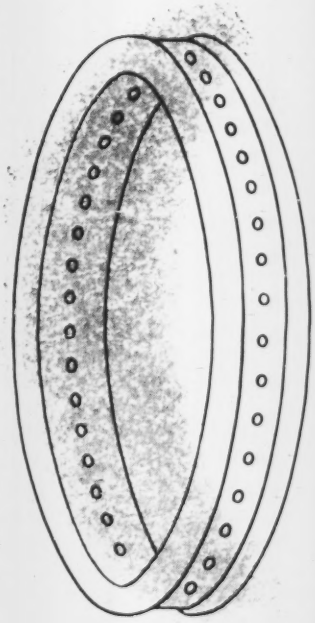
Nuts are screwed down over the lead posts, a piece of wood is placed on the loops and the cell pulled from the battery by a chain or rope. The same tool is also used with hold-down clips for re-

In tomorrow's JET POWER PLANTS



CIRCLE L

LEBANON Castings are at work



Lebanon Steel Foundry, the largest producer of centrifugal castings for jet engines, is proud to have collaborated with the Wright Aeronautical Division, Curtiss-Wright Corporation, in developing this unusual one-piece casting. It incorporates many holes cast to size and in accurate locations, requiring no machining. Of special high-strength alloy steel, this piece is quite large in size and is designed to operate satisfactorily under high temperature conditions in one of Wright's newly-designed power plants.

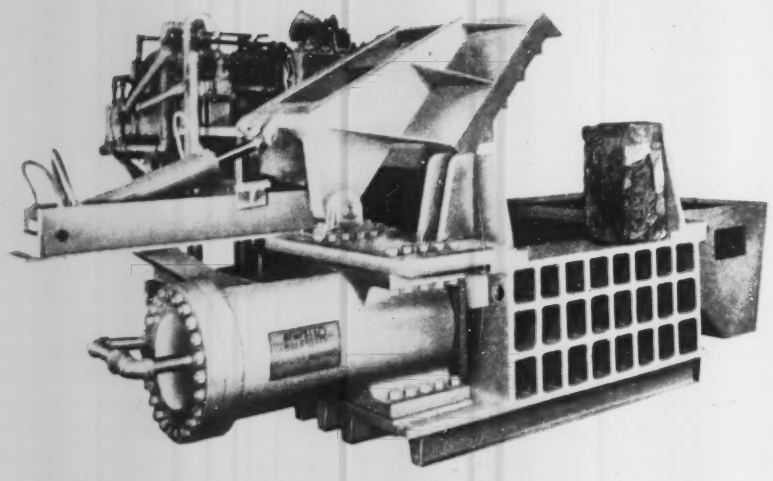
Lebanon Steel Foundry supplies castings to Wright for the J-65 (Sapphire) turbojet engine, which is now in production, and is producing experimental parts for the company's other advanced jet power plants.

LEBANON Castings

CARBON, SPECIAL ALLOY AND STAINLESS STEEL

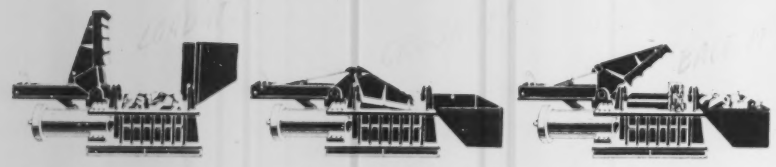
CIRCLE L

LEBANON STEEL FOUNDRY LEBANON, PA.



Here's the nearest thing to Automatic Scrap Metal Baling!

WHEN YOU BUY a Dempster-Balester you not only get a press built to take the punishment of baling scrap metal consistently day-in and day-out . . . bale-after-bale, but you also get the nearest thing to automatic baling. The Dempster-Balester's LOAD IT, CRUSH IT, BALE IT cycle (illustrated below) is a simple 1-2-3 continuous operation.



1—Skip Pan LOADS charging box. 2—Skip Pan returns to loading position while Auxiliary Compression Door CRUSHES scrap. 3—As Compression Door returns to upright position, charging box door closes . . . scrap is BALED and ejected. As each cycle ends another begins.

Without question, Dempster-Balesters are the simplest, most efficient presses baling scrap metal today! And you have six to choose from—three standard and three high speed models that turn out high density bales in capacities to meet any requirement up to 10 tons per hour. Write to us for complete information. A product of Dempster Brothers, Inc.

Sold In Canada by W. P. Favorite Company of Canada, Ltd., 418 Main Street, E., Hamilton, Ontario

Mfg. In Canada by Hamilton Bridge Company, Ltd., Hamilton, Ontario

DEMPSTER BALESTER®

DEMPSTER BROTHERS, 8103 Shea Bldg., Knoxville 17, Tenn.

NEW PRODUCTS and equipment

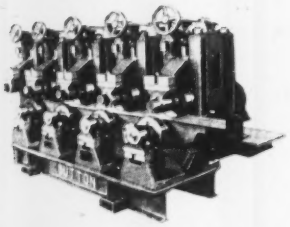
moving elements from the jar. Gould-National Batteries Inc., Dept. ST, Trenton, N. J.

FOR MORE DATA—CIRCLE REPLY CARD NO. 28

Straightening Machine

. . . production or job lots

Squares, flats and structural shapes can be straightened on a production or job lot basis with this machine. The unit is able to straighten squares from $\frac{1}{2}$ to $2\frac{1}{2}$



inches, flats up to 4 x 1 inch, at speeds to 400 fpm.

The machine takes any steel or nonferrous flats and shapes including all grades of alloy and tool steels. The same machine can be furnished as a two-plane straightener or can be converted to two-plane use at any time by addition of a separate unit that draws its power from the original motor. Motorized adjusting screws are available if desired, but are unnecessary as standard equipment. Sutton Engineering Co., Dept. ST, Bellefonte, Pa.

FOR MORE DATA—CIRCLE REPLY CARD NO. 29

Visual Gage Accessory

. . . ten dimensional classes

Segregating ball bearings into any one of ten dimensional classi-

fications after gaging can be done rapidly and accurately with this visual gage accessory. Illustration

Why you can *lower inspection costs*

with a Kodak Conju-Gage Gear Checker

Why the composite check

The composite check recommended in American Standard B6.11-1951 tests gears functionally by running the gear against a master of known accuracy. The resulting displacement shows at once the cumulative effect of as many as six types of error—eliminates time-consuming checks for each individual error. The check is rapid and conclusive.

Why the Kodak Conju-Gage Gear Checker

To meet today's tolerance requirements, the Kodak Conju-Gage Gear Checker uses a master made with a new order of precision. This is the Kodak Conju-Gage Worm Section, produced by thread grinding under control of a precision lead screw.

The accuracy inherent in this method means every right gear is passed by the worm section, reducing rejection losses. The transverse curvature produced by this method provides a master that can be used to check any gear of like pitch and pressure angle, regardless of helix.

Not only can a single worm section be used in place of a number of circular masters, but such a worm section can be reground to specification as often as necessary—at a fraction of replacement cost. It is easily checked for accuracy by familiar toolroom procedures.

You can find out more about the economies possible through Kodak Conju-Gage Instrumentation by sending for a copy of the booklet, "Kodak Conju-Gage Gear Testing Principle." Write to:

Special Products Sales Division
EASTMAN KODAK COMPANY
Rochester 4, N. Y.

The Kodak Conju-Gage Gear Checker automatically records the composite effects of runout, base pitch error, tooth thickness variations, profile error, lead error, and lateral runout. Illustrated is the Kodak Conju-Gage Gear Checker, Model 4U, for gears up to 4⅛" pitch diameter. Larger and smaller models are also available.

CONJU-GAGE INSTRUMENTATION

... a new way to check gear precision in action

To inspect all kinds of complex parts on a bright screen, Kodak also makes two highly versatile contour projectors.

Kodak
TRADE-MARK

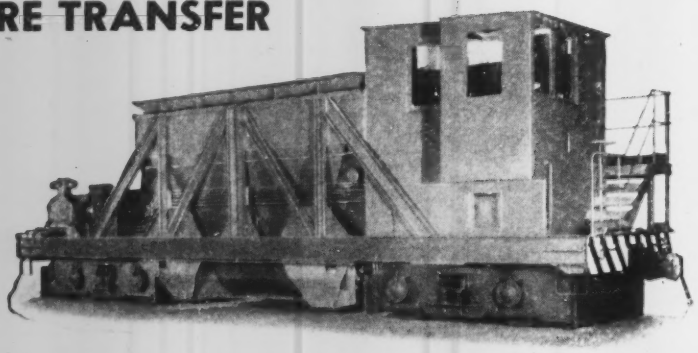
DEPENDABILITY TO SATISFY

RECORD DEMANDS

ATLAS CARS

Atlas Cars for steel plants are known to have that extra work factor which is so important in these days of high production.

50-TON BOTTOM DUMP ORE TRANSFER



This 50-ton ore transfer is a modern air-operated car with a heavy slab truck to protect motors and brakes when plowing through ore piles. For added safety a folding car pusher arm is used and is provided with a safety latch which cannot be lowered unless the switchman holds the latch. The overhung cab allows a clean line of vision for the operator.

Special features include electric hopper heaters, centralized lubricating, roller journal bearings, air brakes and, of course, all necessary safety features.

Custom Builder of Steel Plant Cars

THE ATLAS CAR & MFG. CO.

ENGINEERS MANUFACTURERS

1140 IVANHOE RD. CLEVELAND 10, OHIO, U. S. A.

NEW PRODUCTS and equipment

shows a ten-place classification tray being used with a visual gage of 10,000 to 1 magnification. However, the tray can be used with other magnifications and can be adapted for any number of ball sizes.

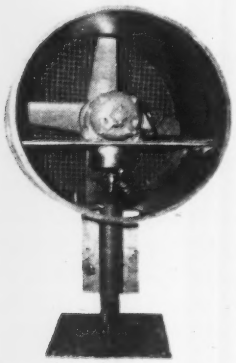
Balls are gravity fed from the v-trough into a receiving hole in a slide. Moving slide to the right carries the ball into position beneath the gaging spindle where it rests on a carbide surface. Operator takes the reading and moves the tray until proper size compartment is under the ejection chute. No special skill is required to classify ball sizes in increments of 0.000010-inch. Sheffield Corp., Dept. ST, Dayton 1, O.

FOR MORE DATA—CIRCLE REPLY CARD NO. 30

Oscillating Fan

. . . arc of about 60 degrees

Oscillating man cooling fan has propeller mounted on the shaft of a totally-enclosed ball bearing motor. Most common size has a 36-inch propeller with a 1 hp, 1200 rpm motor. Oscillating mechanism is driven by a gear head motor mounted on the fan pedestal and

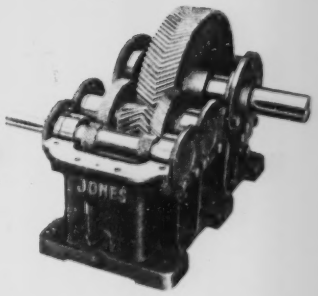


connected through an operating arm to a ball bearing equipped motor base.

Fan oscillates through an arc of about 60 degrees, at a speed of about ten times per minute. Fan assembly can be mounted on the floor or suspended in an inverted position from the ceiling or an overhead platform. Robinson Ventilating Co., Dept. ST, Zelienople, Pa.

FOR MORE DATA—CIRCLE REPLY CARD NO. 31

One of two new Allis-Chalmers kilns at Basic Refractories Inc. Maple Grove, Ohio plant. Dual drives engineered by Allis-Chalmers Mfg. Co. and W. A. Jones Foundry & Machine Co.



Driving a non-stop giant size rotary kiln calls for PLUS PERFORMANCE

That's why Basic Refractories selected JONES HERRINGBONE GEAR SPEED REDUCERS to drive two new rotary kilns — the largest in the world's refractory industry — at their Maple Grove, Ohio dolomite processing plant.

Operations at Basic are continuous. In processing, dead burned dolomite must be constantly *ON THE MOVE* — a drive failure could result in serious damage from the hot mixtures in the kiln.

Naturally, Basic Refractories' engineers took utmost care in the drive component selection for this important application. And, naturally, they chose JONES HERRINGBONE GEAR DRIVES because of their proven ability to stay on the job and take the 'round-the-clock, day-in and day-out punishment of continuous operation.

Giving PLUS PERFORMANCE under these and similar conditions is nothing new for any type Jones Speed Reducer — all are recognized and accepted throughout industry for all sorts of applications demanding rugged dependability, maximum capacity and quiet, smooth, power transmission.

BIG DRIVES — SMALL DRIVES — You may not have a giant kiln to drive; but when you have a power transmission job, big or small or anything in-between, your best answer is JONES . . . it has been for over 60 years.

W. A. JONES FOUNDRY & MACHINE CO., 4437 W. Roosevelt Rd., Chicago 24, Ill.

Ask for Catalog 70

Since 1890 . . . In the Service of Industry

Jones

HELICAL-WORM — WORM — WORM HELICAL — GEAR SPEED REDUCERS
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ANTI-FRICTION PILLOW BLOCKS • FLEXIBLE COUPLINGS

Another new member in the family of BIRDSBORO Copper Bearing Rolls

BIRDSBORO, a great name in rolls, now offers you still another great roll . . . the BIRDSBORO "75" . . . a heat-resistant copper bearing roll designed especially for tough rolling requirements. Like all BIRDSBORO rolls, the "75" is "custom-built" to meet your specific requirements. For long range rolling efficiency and higher product quality, let BIRDSBORO's Individualized Roll Service go to work for you.

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specimens in position than it is to clamp them in a vise.

Toughness—Effect of low temperatures on the toughness of metals varies widely. Reasons for this are not known, but one generalization may be drawn: Metals having a face-centered, cubic crystal lattice, such as copper, lead, nickel and aluminum, undergo no loss in toughness when refrigerated to low temperatures.

On the other hand, metals with other types of lattices, such as body-centered, cubic iron, may undergo marked decrease in toughness. Energy required to break nickel jumps from 89 ft-lbs at room temperature to 99 ft-lbs at −300° F. Titanium, which has a hexagonal structure, drops from a value of 14.5 ft-lbs at room temperature to 6.6 ft-lbs at −300° F.

So long as the face-centered cubic structure is preserved, addition of alloying elements to the metal does not interfere with the maintenance of toughness at low temperatures.

In fact, alloying of a body-centered cubic metal to render it face-centered cubic (iron alloys with nickel or nickel and chromium, for example) endows it with more resistance to embrittlement at low temperatures than face-centered cubic metals. Energy of 77 ft-lbs is needed to break 80 Cu, 20 Ni at room temperature. Energy required at −300° F is 85 ft-lbs.

Outlook—Greatest interest is being shown in steel for low-temperature work.

To define temperature regions of safe applications, Charpy tests are often used to show energy required for failure and type of failure. Careful examination by a trained eye will reveal percentage of cleavage (brittle) and shear (tough) fracture. Nature of break then can be plotted against the temperature of testing, along with the energy curves.

Transition — It has been found that departure from 100 per cent shear fracture doesn't necessarily limit the usefulness of a steel. Toughness is a matter of degree and 100 per cent brittle fracture may not occur until temperature has been reduced another 100 degrees or so. This is the transition range.

Transition range serves to classify materials for use in various ranges of subatmospheric temperature service. For general industrial applications, ASTM recognizes 15 ft-lbs (total energy absorbed in breaking a keyhole-notched, Charpy specimen) for specification purposes. One specimen in three may fall below this, but in no case may it be lower than 10 ft-lbs.

Steel Plate — Low temperature requirements for ASTM grade A201 steel plate is: Tensile strength, 55,000 to 72,000 psi; minimum service temperature, −50 degrees and normalizing temperature, 1575 to 1650° F.

Here an addition of 2.5 per cent nickel permits lowering service temperature of carbon steel plate from −50 to −75° F. Use of 3.5 per cent nickel allows further lowering of the service temperature to −150° F.

These steels must be made by the open hearth or electric steel processes.

Adapted in part from a paper written by Francis B. Foley, consulting metallurgist, Bayonne Research Laboratory, International Nickel Co., Inc., Bayonne, N. J.

TENSILE PROPERTIES OF METALS

Metal	at Room Temp T.S. PSI	Elong %	Red. %	at −300F T.S. PSI	Elong %	Red. %
Copper	32,500	48	77	50,500	58	77
Lead	3,000	33		6,250	40	
Nickel	65,000	29	42	97,500	53	75
Aluminum	9,750	36	90	21,000	44	87
Iron (Armco)	46,000	28	73	112,000	nil	nil

TENSILE STRENGTH OF ALLOYS

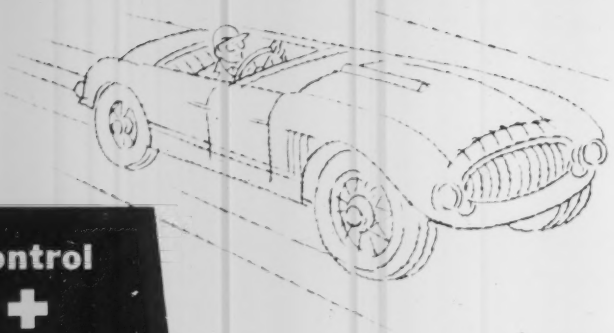
Alloy	Tensile Strength, Psi at Room Temp	at −300F
80 Cu, 20 Ni	51,500	74,000
Monel Metal (66 Ni, 31 Cu)	58,000	
Al Bronze (7-10% Al)	77,500	96,000
70/30 Brass (30% Zn)	51,500	73,500
Magnesium (3 Al, 1 Zn, .5 Mn)	40,100	62,800
42% Ni Fe	81,500	131,500
18/8 Stainless	86-92,000	193-223,000
Steel, C. 13%	66,000	112,000
Alloy Steel (Ni-Cr-Mo)	152,500	208,500

NOTCHED BAR IMPACT VALUES OF METALS

Metal	Crystal Lattice	Energy to Break at Room Temp	Ft. Lbs. at −300F
Aluminum	Face Centered Cubic	19	27
Copper	Face Centered Cubic	43	50
Nickel	Face Centered Cubic	89	99
Iron (Armco)	Body Centered Cubic	78	1.5
Titanium	Hexagonal	14.5	6.6
Magnesium	Hexagonal	4	3 at −108F

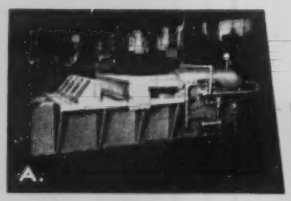
NOTCHED BAR IMPACT VALUES OF ALLOYS

Alloy	Energy to Break at Room Temp	Ft. Lbs. at −300F
80 Cu, 20 Ni	77	85
Monel Metal	219	196
Inconel (80 Ni, 13 Cr)	236	187
50% Ni Fe	81	76
Stainless 18-8	99-118	98-116



control + speed

Hand-crafted sports cars are precision-built to hug the curves — take any road conditions — to provide the ultimate in control, speed and safety. Like these prima-donnas of the highways, BEATTY machines are constructed on precise tolerances to afford the same kind of exact control, speed and safety in industrial metal fabricating. One of the machines illustrated can be modified to suit your particular problem. Or, let our engineers recommend, design and build one to your exact requirements.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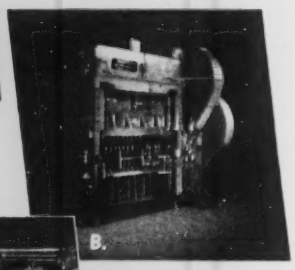
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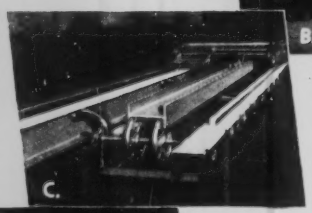

C.

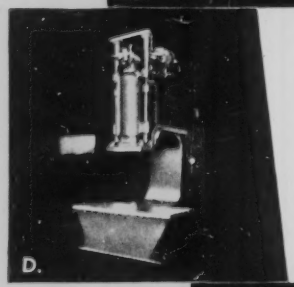
A. BEATTY Horizontal Hydraulic Bulldozer for heavy forming, flanging and bending.

B. BEATTY Guillotine Beam Punch. Punches webs and flanges in "I" beams from 6 to 30 inches.

C. BEATTY Spacing Table handles web and flange punching without roll adjustment.

D. BEATTY Gap Type Press for forming, bending, flanging, pressing. Capacity 250 tons.

E. BEATTY Guillotine Bar Shear for angles, bars, rounds, squares without changing tools.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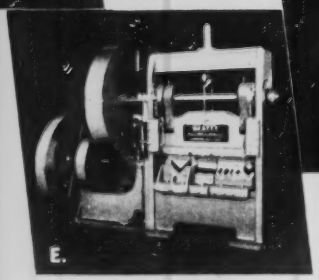
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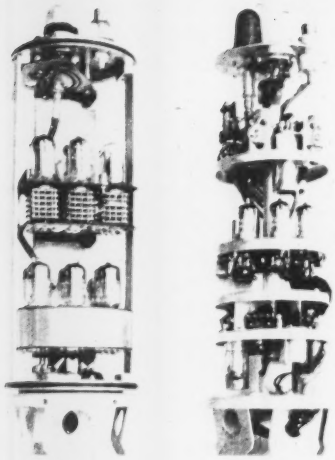


Evidence of what can be done with the circuity refinements of Project Tinkertoy is shown here. On the right is conventional submarine detection device. Simplified circuit is at left

Navy's Project Tinkertoy

Production system will greatly simplify electronics manufacture. Maintenance eased, too

REVOLUTIONARY production system code-named Project Tinkertoy which turns out complete units from electronic components and offers industry an entirely new pattern of manufacturing short cuts, is announced by the Navy and the National Bureau of Standards.

Process makes possible the manufacture of certain electronic equipment through mechanized assembly of bulk or raw materials with a minimum of hand labor and at considerable saving in time.

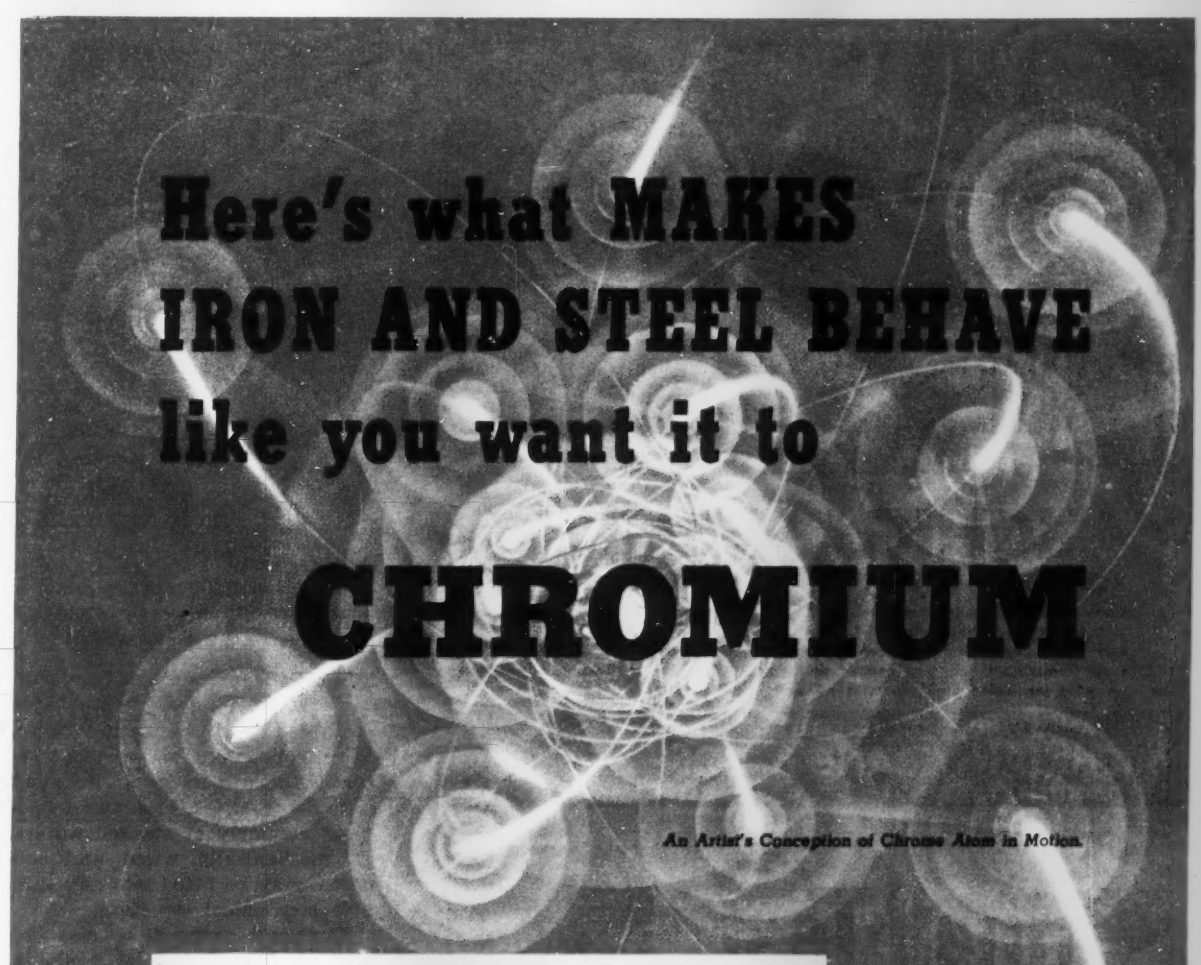
Breaks Bottleneck—The method of production grew out of a search by the Navy Bureau of Aeronautics for a means to break the electronics bottleneck which posed a serious logistical problem in World War II and at the beginning of the Korean conflict, and which confronts military planners in event of all-out mobilization.

Basic element in the NBS modular design system is a ceramic wafer of electrical grade steatite with three notches equally spaced on each side. On the two faces of the wafers are assembled resistors, capacitors, inductors, tube sockets and other electrical components.

Stacked Up—A series of these wafers when stacked one above

Here's what MAKES IRON AND STEEL BEHAVE like you want it to

CHROMIUM



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FOUNDRY GRADE FERRO-CHROME
60-66% Cr. 6-9% Si.
4-5% C.

FERRO-SILICON CHROME
48-52% Cr. 25-30% Si.
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each containing
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Plus
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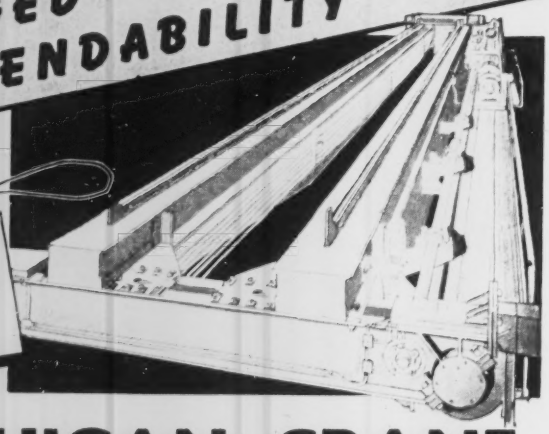

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Machine makes individual capacitor wafers under 3000 pounds pressure. Thickness must be closely controlled

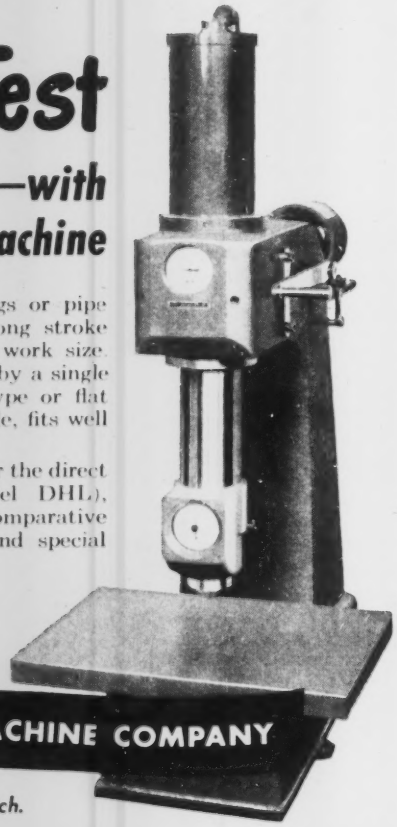
the other, notches aligned and conductors fitted, interlock in a wide variety of circuit arrangements. Wire conductors serve as structural supports as well as circuit conductors. The end product, a plate assembly of stacked wafers, all mechanically wired and soldered, may be fitted into any suitable mechanical structure.

Electrical connection may be made to it by several methods. Perfection of a plug-in connection, promising a practical method of

Brinell Test
large pieces fast—with this long stroke machine

Large awkward castings, forgings or pipe are easily tested because the long stroke eliminates screw adjustment to work size. The hydraulic ram is controlled by a single lever. Large, stationary roller-type or flat table makes work handling simple, fits well into a conveyor line.

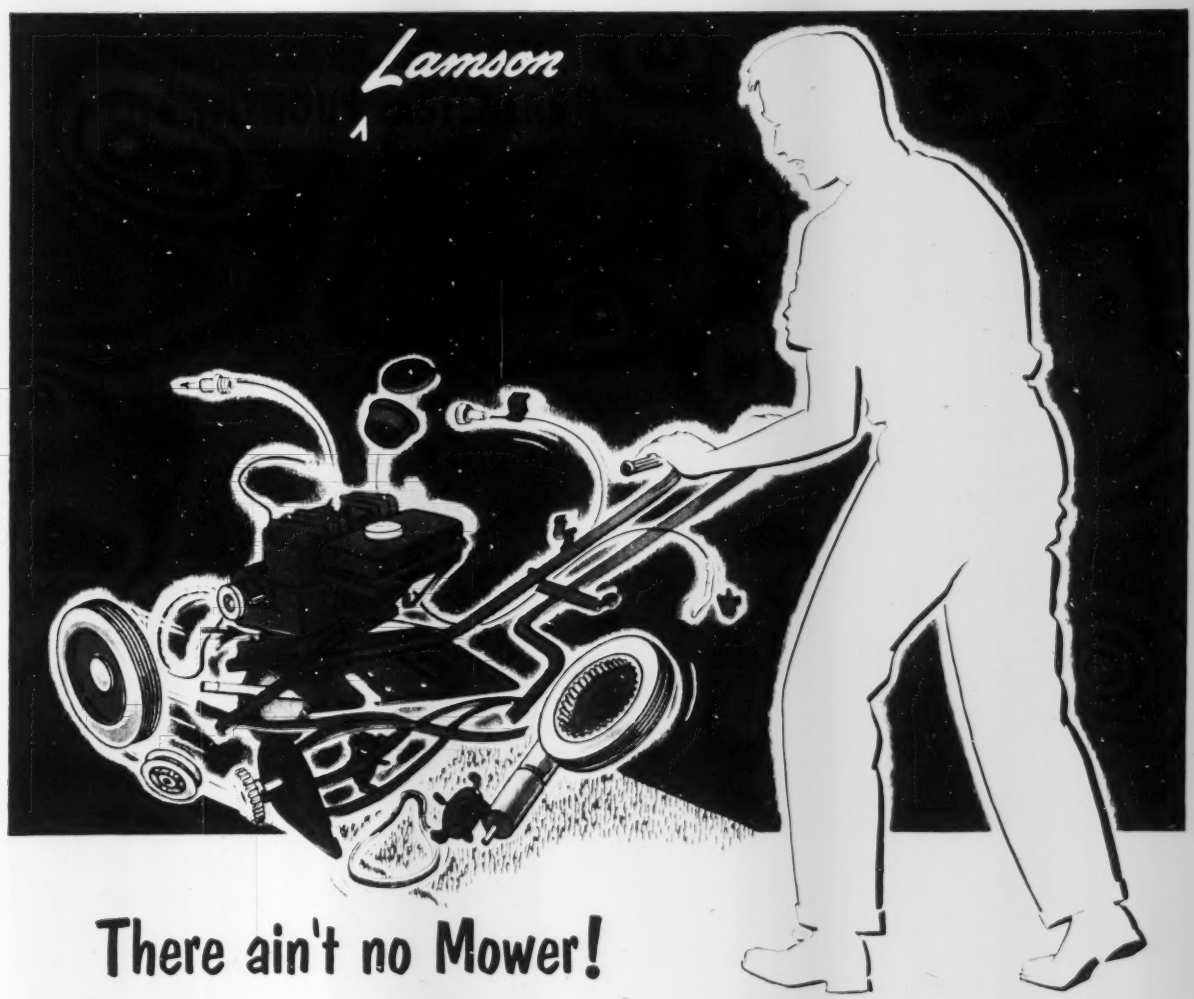
Choice of plain Brinell machine or the direct reading machine (shown, model DHL), where dial at end of ram gives comparative hardness immediately. Larger and special machines may also be had.



Write for more information on all our Brinell testing machines.

DETROIT TESTING MACHINE COMPANY
9380 Grinnell Ave., Detroit 13, Mich.

Notch-pa nting machine puts the silver conductor metal on individual wafers



There ain't no Mower!

Bolts and nuts are a "grass roots" necessity to the proper functioning of most mechanical products. Take away the bolts and nuts from a motor lawn mower, for instance, and literally "There Ain't No Mower"!

But in spite of their importance, the cost of the fasteners that go into a *single unit* of any product represent a small percent of its total manufacturing cost.

So it's just plain, good common sense always to use bolts and nuts you *know* are dependable as well as economical.

Lamson & Sessions, with 87 years of experience supplying industry with the best in fasteners, offer you unexcelled facilities to meet your bolt, nut and screw requirements.

Remember, it's *pleasant* and *profitable* to do business with Lamson & Sessions.

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Precision made for fast, economical assembly.

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Ideal for blind or hard-to-reach places.

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Choice of round, pan, truss, flat oval, hexagon and Phillips heads.

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Semi-finished, hot pressed, cold forged.

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Economical, vibration-proof. Can be used repeatedly.

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Steel, brass, aluminum and stainless steel.

"1035" SET SCREWS
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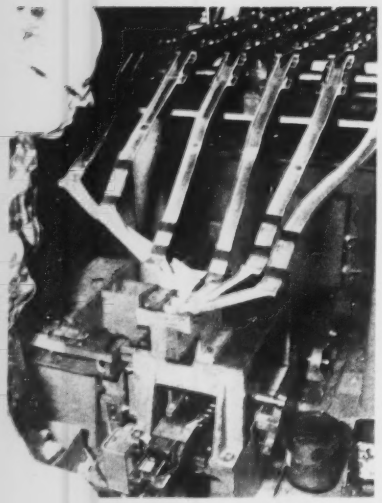

Ceramic wafers are assembled and soldered into modules on this machine

utilizing the plate assembly, will enable relatively untrained personnel to replace quickly any defective part of an electronic unit.

Sample Test — A complex submarine detection device, which is needed in large numbers in time of war, was selected for a sample test. Keeping to the same size and performance requirements, the new machine-made modules were substituted for the previous maze of wiring, resistors, capacitors, etc.

After a sample device passed the tests completely, a contract was awarded to the Kaiser Electronics Division of the Willys Motors, Inc., to manufacture the device on the new machines in order to determine whether they could be mass produced.

Protective Coating Brochure

Zincilate, a replacement for galvanize, plating and multi-coat painting methods on a variety of iron, steel and aluminum products, is described in an illustrated brochure published by Industrial Metal Protectives Inc.

Available in six basic formulations, Zincilate may be applied by spray, brush, dip or flow-coat methods. On many applications, one coat provides protection against corrosion and abrasion. Copies of the brochure are available by writing to the company at 401 Homestead Ave., Dayton 8, O.

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Producers Pare Stamping Costs

Modern Coil Handling Equipment Widens Use of Low Cost Coil Stock

The battle to keep down costs is going well for producers of stampings. Coil stock and modern coil handling equipment are the decisive factors. Coil stock, with only two scrap ends to its entire length is far more economical than strips of straight stock with two scrap ends to every ten feet. Moreover, the type of coil loading and handling equipment built by F. J. Littell Machine Co. makes coil stock easier to handle than straight stock. Stamping producers are taking full advantage of these developments. Coil stock and Littell Coil Hooks, Reels, Straightening Machines and Automatic Roll Feeds are in wider use today than ever before.

Hooks Serve Two Ways

. . . Littell Hooks make it a simple matter to unload coils on delivery, and to load reels. The variety of sizes have lifting capacities from 1,000 to 40,000 pounds.

Two Types of Reels . . .

Littell Coil Cradle Reels mount heavy coils, up to 30,000 pounds. Spindle Reels handle coils up to 40,000 pounds. Each type is available in plain or motor driven designs.

Straighteners Flatten Stock... Removing curvature from coil stock, as it passes from reel to punch press die is the function of Littell Straightening Machines. All models are the same basic design. Variation is in the number and diameter of straightening rollers employed . . . from 1" to 90" in width, and from .010" to .125" thickness.

Automatic Roll Feeds . . . Press output in many shops has been multiplied five times by simply attaching Littell Roll Feeds to presses for blanking, drawing, piercing, or cut-off work. The Littell Roll Feed is used with compound dies, single station dies, and progressive dies. Standard models are easily attached, serve all types of presses, and handle all standard widths and thicknesses of stock.

Descriptive details and prices on Littell Hooks, Reels, Straighteners and Roll Feeds are available on request. Inquiries are given immediate attention when addressed to

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Positive-Locking Inserts

Simple key ring that makes it easy to install or remove insert prevents rotative action

SIMPLIFIED locking system for threaded fasteners such as inserts and studs is provided by a new method of fastening called Kelox. Positive locking against rotative action is accomplished with a simple ring key which makes it easy to install or remove the insert or stud without use of special tools.

Basically, this method of thread locking is made up of a ring with smooth inside and outside diameters. Extending from the bottom surface of the ring are two keys. These are the heart of the method and mate with a keyway in the insert or stud.

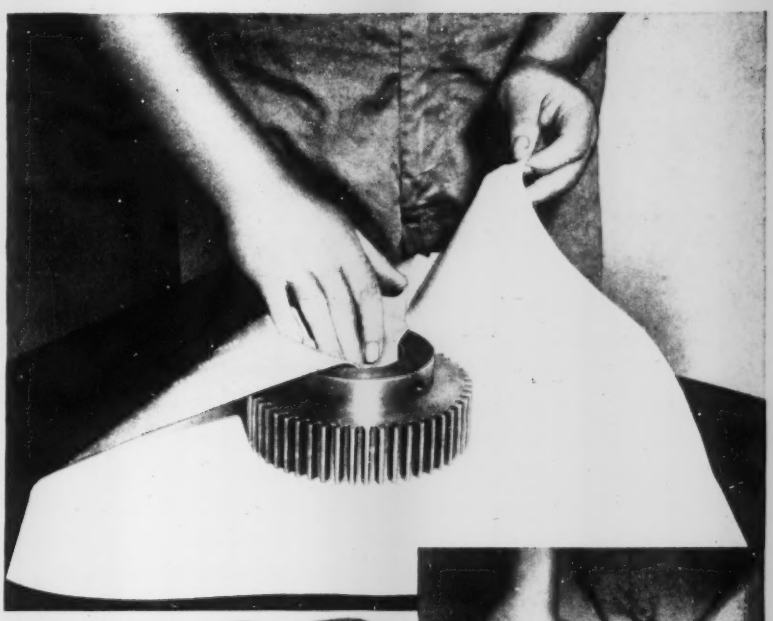
Key-to-Keyway Lock — When pressed into position, the keys, guided by the keyway in the insert or stud, cut their way through sufficient threads of the parent body tapped hole to provide a simple, positive key-to-keyway lock between the two threaded bodies. By interrupting helix continuity of threaded hole and threaded fastener, rotative action between threaded bodies is positively prevented.

Torque tests carried out in both ferrous and lightweight nonferrous materials show bolts either broke or necked in the threads with no rotation of the insert.

Characteristics — Manufacturer, Fasteners Inc., New York, reports operating characteristics make the fastener simple to install or remove with no special tools required, with high stress allowable per space required. No ineffective thread zone exists.

Short insert and stud end threads can be used because of maximum effective thread use. This permits applied use in thin plates as well as heavier structural sections. In addition, minimum edge distances can be used. Installation of the ring and companion part creates no lateral stresses that would cause splitting or other damage.

Threads of special pitch diameter are not required to insure positive locking. No dimensional changes are required in the parent material regardless of material in which the fastening is installed.



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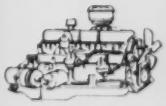

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Bright Nickel Plating

Organic-type process produces brighter coatings. It's easy to control and cheaper

WHAT MAY be the most significant development of the year in the electroplating industry was disclosed today by Hanson-Van Winkle-Munning Co., Matawan, N. J., when it announced the development of a new bright-nickel process called Nickel-Lume.

The organic-type process produces better and brighter nickel coatings, is cheaper to operate and is easier to control than other commercial bright-nickel processes now available.

Costs Lowered—Both installation and operating costs are lower. Equipment suitable for a Watts nickel bath is all that is required. Ordinary auxiliary equipment may be used, filtration may be either periodic or continuous, ventilation is not required and heat demands are up to 25 per cent lower.

Characteristically, deposits with the Nickel-Lume process have:

1. A bright white color. The deposits approach the whiteness of the well-known cobalt-nickel deposits.

2. Well-leveled surfaces. Nickel-Lume reduces surface roughness by 50 per cent and over. This cuts down or eliminates polishing or buffing operations.

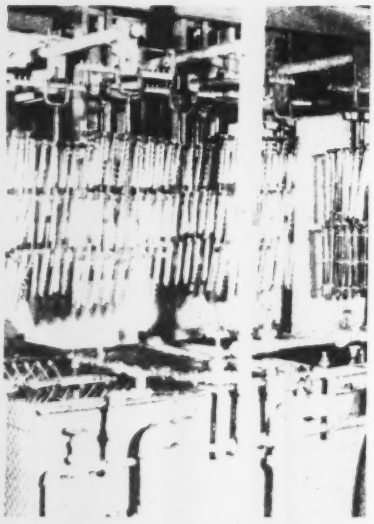
3. Low internal stress. To prevent cracking, crazing and lifting of deposits, the compressive or tensile stress in these deposits may be easily controlled. Stress may be held within satisfactory limits as the solution ages.

4. Good ductility. In comparative nickel tests, Nickel-Lume foils have shown surprising ductility, which continues after the bath ages.

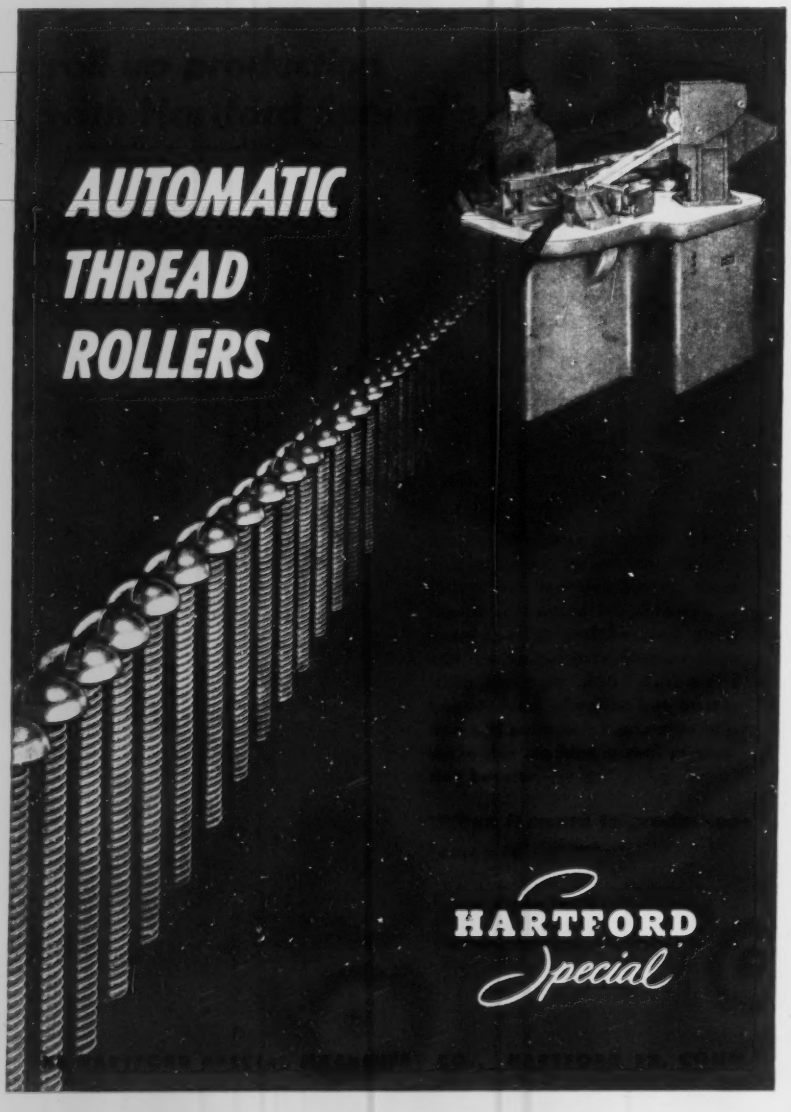
5. Highly active surfaces. Deposits accept chromium without any activating treatment.

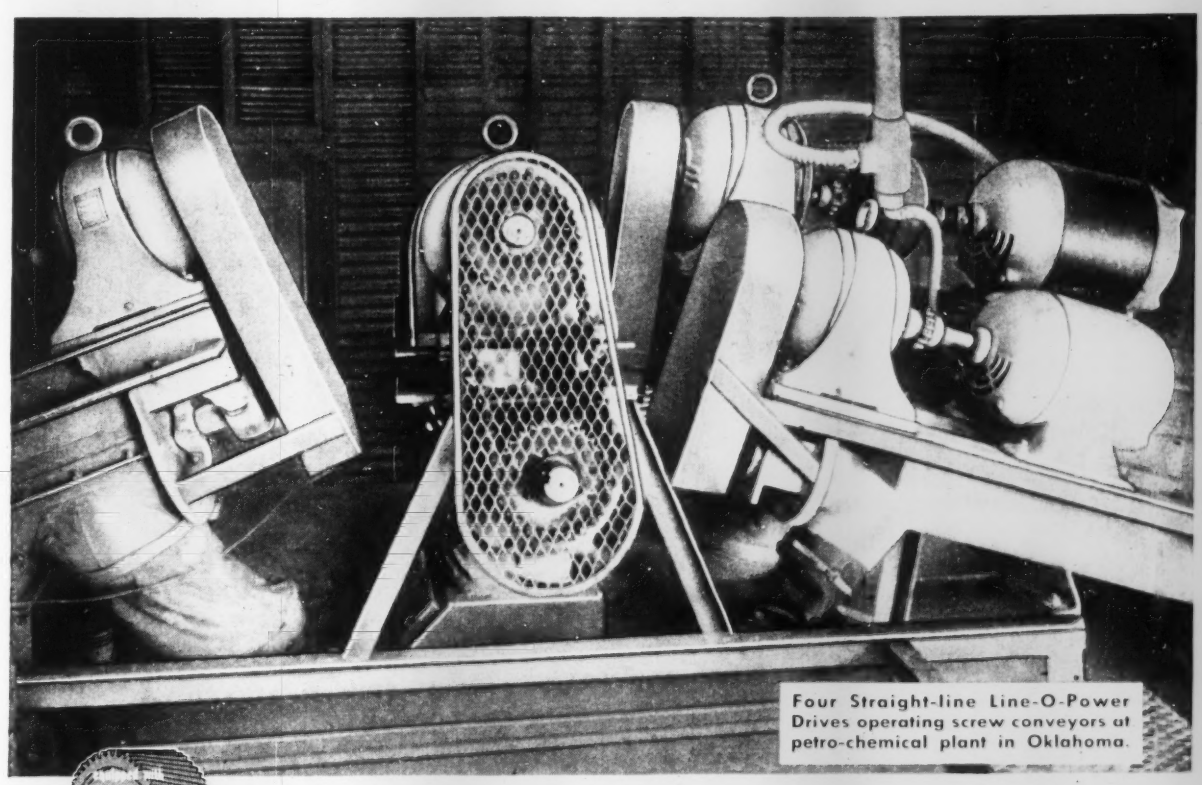
Operating Conditions — Nickel-Lume baths may be operated from room temperatures up to or beyond 140° F with full deposit brightness. With moderate to high current densities, a temperature beyond 120° F is seldom required.

Current densities may be varied from 5 asf to above 70 asf. Because of this wide range, uniformly bright deposits may be plated on intricately-shaped articles, and plating speed may be changed to meet various specifications and production schedules.



NICKEL PICTURE BRIGHTER
. . . new process gets the nod





Four Straight-line Line-O-Power Drives operating screw conveyors at petro-chemical plant in Oklahoma.

This Trademark Stands for the Finest in Industrial Gearing

solve your space and weight problem . . . with LINE-O-POWER*

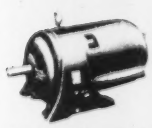
When limited space governs a reducer's size — when weight is a critical factor — LINE-O-POWER is your drive.

Line-O-Power Drives are smaller, lighter, more compact — yet offer almost any reduction you need — because Duti-Rated Lifetime Gearing assures maximum load-carrying capacity in minimum space. Newly-developed Duti-Rated Gears have high hardness, extreme accuracy — permit *big* savings in size and weight.

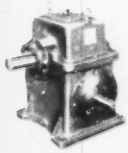
Longer life — higher efficiency — quieter operation — these are Line-O-Power advantages, brought about by Duti-Rated Lifetime Gearing, unmatched in the industrial gear field.

Sturdy Line-O-Power Drives are available for prompt delivery — in straight-line or right-angle design — with foot or flange mountings — for horizontal or vertical service. Talk over your requirements with the Foote Bros. representative, or write for helpful information.

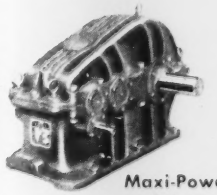
REG. U. S. PAT. OFF.



Foote Bros.-Louis Allis Gearmotors



Hygrade Drives



Maxi-Power Drives

FOOTE BROS.

Better Power Transmission Through Better Gears

Foote Bros. Gear and Machine Corporation
Dept. X, 4545 South Western Boulevard, Chicago 9, Illinois

Please send information about Line-O-Power Drives.

- ☐ Bulletin LPB on Straight-Line Units.
- ☐ Bulletin LWA on Right-Angle Units.

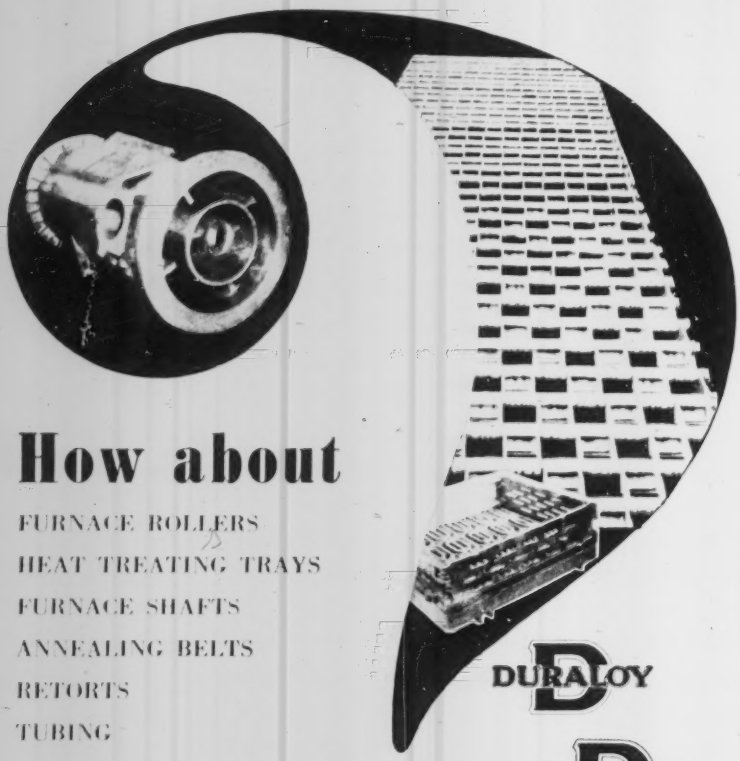
Name .....

Position .....

Company .....

Address .....

City ..... Zone ..... State .....



How about

FURNACE ROLLERS
HEAT TREATING TRAYS
FURNACE SHAFTS
ANNEALING BELTS
RETORTS
TUBING

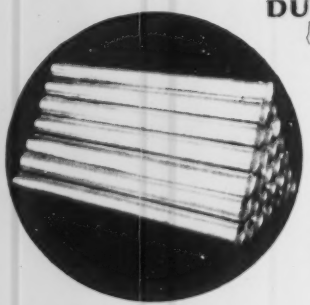
DURALOY

DURASPUN

Which are
Heat Resistant

Corrosion Resistant

Abrasion Resistant



When ready to order, how about checking with us here at DURALOY? For more than thirty years we have specialized in high-alloy castings. In fact, we were among the first to produce static castings and the first to produce centrifugal castings. We are old hands at producing castings alloyed to fit each specific requirement and to finish them to any extent desired.

Melt, castings and finishing are carefully controlled and quality tested by our staff of metallurgists, chemists, X-ray and gamma-ray technicians. If you would like more preliminary information, send for Bulletin No. 3150-G.

THE DURALOY COMPANY

Office and Plant: Scottdale, Pa. • Eastern Office: 12 East 41st Street, New York 17, N.Y.

Detroit Office: 7390 Woodward Avenue • Pleasant Ridge, Mich.
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Automatic Contour Welder

It's easy with this Ryan-inspired rig. Maintains constant arc over all irregularities in contour

NEWEST production tool at Ryan is an automatic welding machine which welds around corners. With unerring accuracy this equipment makes perfect fusion welds, automatically, over irregular surfaces.

Welding electrode follows the "peaks" and "valleys" of the contour with greater precision than human hands could achieve.

In Use—Operator simply clamps a large irregular part, such as a stainless steel afterburner nozzle, in the machine, trips a few buttons, and the uncanny process begins. Electric arc strikes between the tungsten electrode and the work, blanketed by a flow of inert gas which prevents oxidation of the weld seam. Welding head moves horizontally along the seam, fusing the metal and depositing filler wire as it goes. At every irregularity in contour, the electrode head instantly raises or lowers, maintaining a constant arc and making uniformly perfect weld deposits.

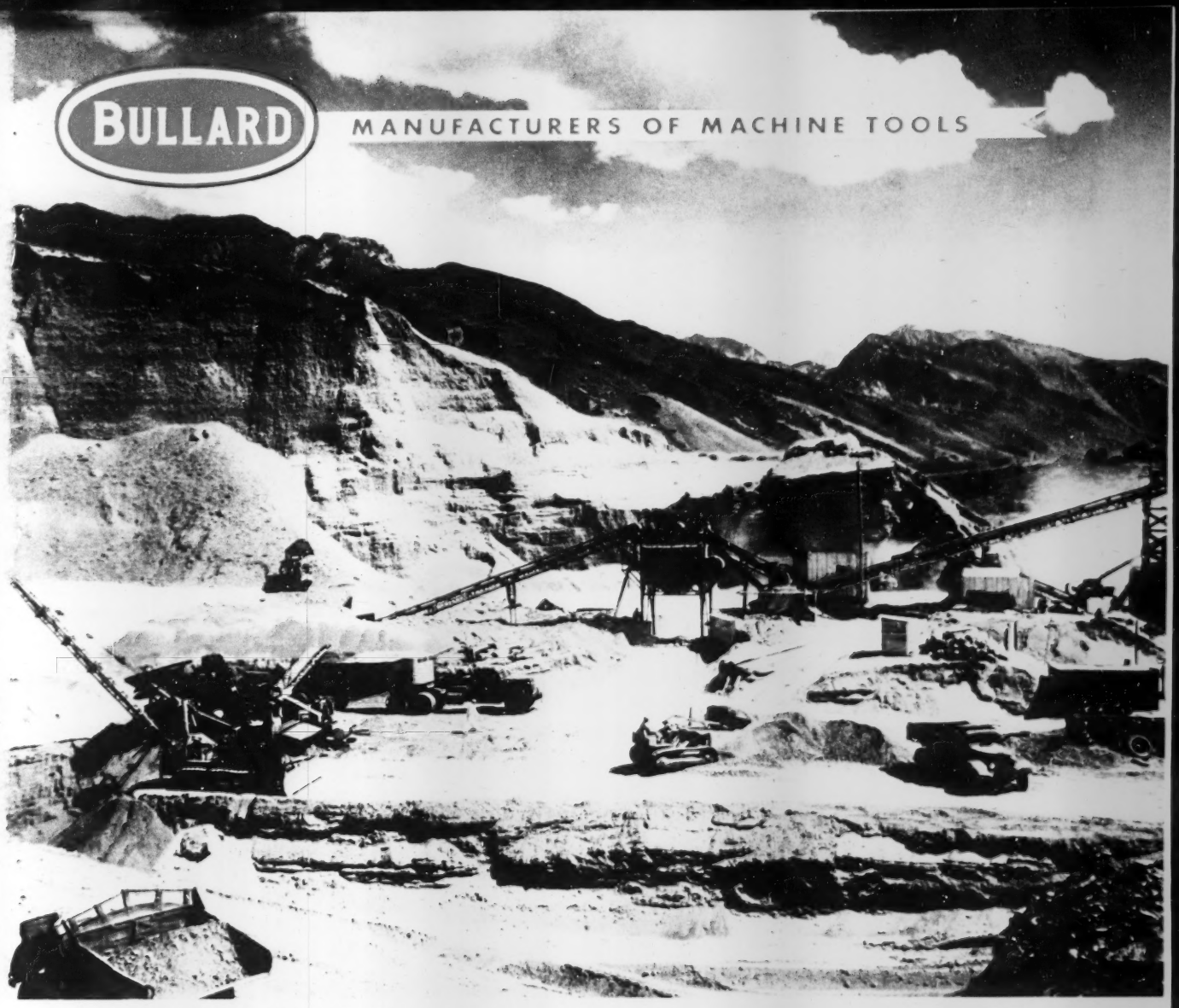
Machine is composed of three major assemblies. Airco welding equipment is employed to perform the inert gas-shielded welding task. This equipment is mounted on a Linde side-beam carriage which rolls back and forth on bearing rollers attached to a horizontal 12 x $^{3}/_{4}$-inch steel plate. By setting a dial for required feed speeds, this mechanism will maintain a precise speed. An electric motor drives the carriage assembly through a gear and rack on the rear of the plate. Electronic control eliminates any variations in speed and assures smooth action.

Vertical Travel—Ryan plant engineers have mounted the above equipment on a large steel frame which is attached to threaded steel shafts inserted in steel vertical columns. By push button control, the operator actuates another electric motor which turns the threaded shafts, through a chain drive, to raise or lower the entire assembly. An adjustment of between two and five feet from the floor can be made.

For each production part, Ryan builds a steel holding jig which se-

BULLARD

MANUFACTURERS OF MACHINE TOOLS



Operation of Huge Gravel Pit — Salt Lake City, Utah

Caterpillar Tractor Co. Photo

The Invisible Background of Industrial Progress

So common a sight is the well known gravel pit that little importance is attached to the fact that it is one of the important natural resources essential to the building of highways, other grading projects, concrete structures, buildings, huge dams and bridges, dykes for flood control and flooded land reclamation.

In each of these and many other uses the competitive low cost handling from the gravel pit to the end use is dependent upon modern equipment — digging, transportation, grading, mixing or final placement. Such equipment is basically a product of manufacturing processes

* dependent upon *Modern Machine Tools*.

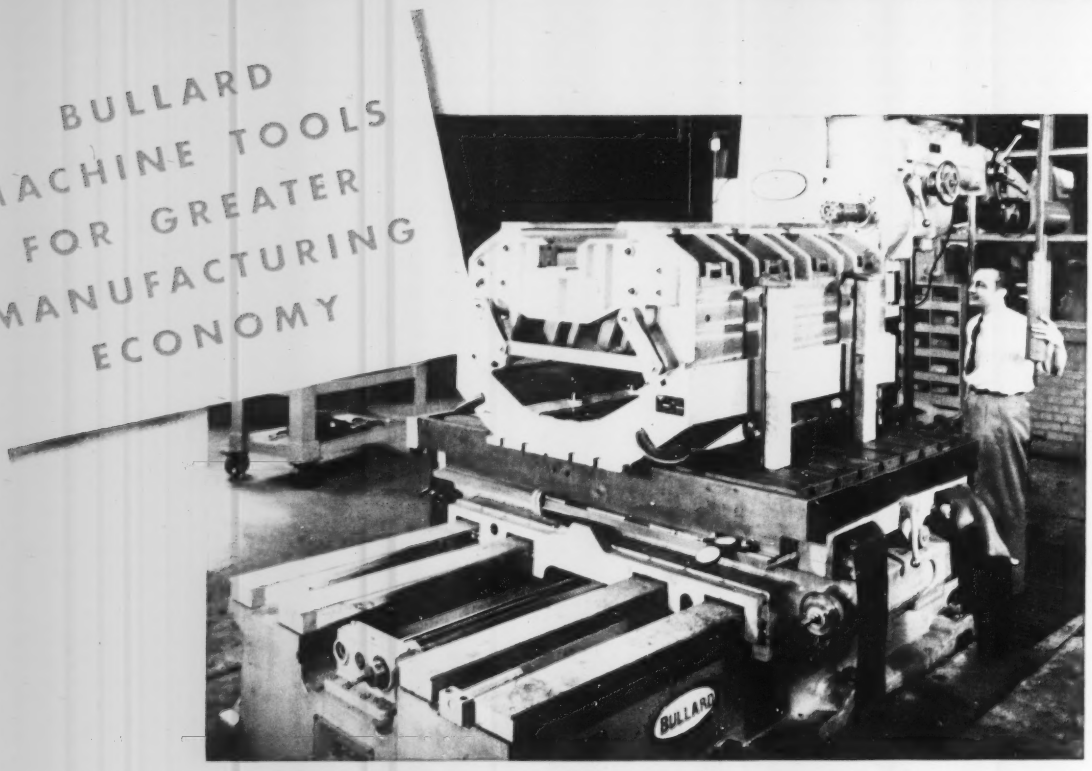
Bullard has had years of experience in efficiently servicing the needs of producers of essential equipment which meet the growing economic needs of "The Invisible Background of Industrial Progress."

* *For greater manufacturing economy REFER to next page.*

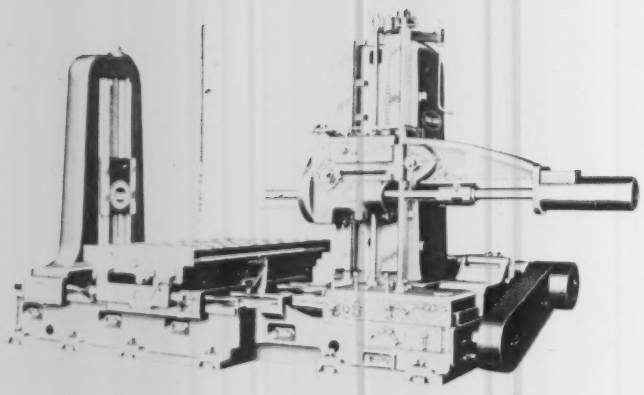
THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

BULLARD MACHINE TOOLS FOR GREATER MANUFACTURING ECONOMY



For diversified performance plus utility, The Bullard Boring, Milling and Drilling Machine offers maximum accuracy and efficiency.



The 4 Way Bed on the Bullard 4 inch and 5 inch spindle Horizontal Boring, Milling and Drilling Machines provides rigid support for the table, permitting heavier work loads with a higher degree of repetitive accuracy.

These machines, built to exact standards of quality, have great productive ability and maintain a high degree of accuracy to meet any customer requirement, thereby reducing manufacturing costs.

Ask a Bullard engineer to explain the many features of this versatile and reliable machine — you'll be glad you did.

BULLARD

Time saved is money earned. Write now for information on Bullard Horizontal Boring Machines.

THE BULLARD COMPANY BRIDGEPORT 2, CONNECTICUT

WELDS THE PEAKS AND VALLEYS
. . . arc follows any contour bumps

cures the assembly with pneumatic clamps. These jigs are designed with a counterbalanced side frame, which swings up to allow correct positioning of the part. After the component is welded, a locking member of the jig is opened and the part is pulled out the end.

Report On Magnets

Information on the uses, design, properties and manufacture of Alnico permanent magnets, cast grade 7, is available in the 4-page technical report PM-112 issued by Carboloy Department of General Electric Co.

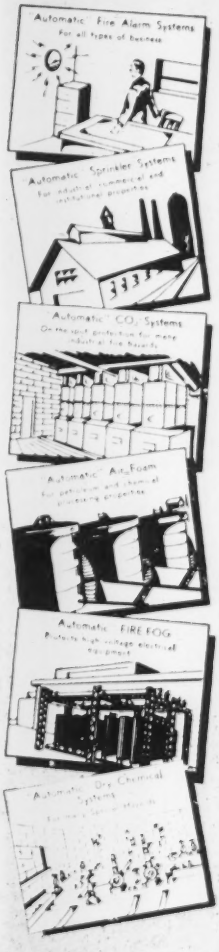
In addition to graphs and tables explaining magnetic and physical characteristics of the magnets, the report includes discussion of design considerations, test information and comparison of cast grade 7 with other magnetic materials.

ASME Lists Aluminum Alloys

Another sign of stiffening competition between metals is the listing of five additional aluminum alloys in the latest ASME Boiler and Pressure Vessel Code.

Seven aluminum sheet and plate alloys are now listed and, also for the first time, alloy specifications have been included for bars, rods and shapes; bolting materials, pipe, tube and forgings.

Sheet and plate alloys now listed are 4S, 50S, 52S, 61S and a new corrosion resistant alloy



You've no doubt read or heard from time to time that one or another type of fire protection is the correct answer to your safety problem. One says foam is best. Another says water sprinklers are the answer. Perhaps carbon dioxide, dry chemical, or other media will do the trick.

What is the most effective method?

Without a thorough understanding of all conditions involved, we wouldn't hazard a guess. For fire protection, like any other scientific problem, requires (1) technical know-how, and (2) application of that knowledge. Most methods of fire safety are good . . . but only through "FIRE PROTECTION ENGINEERING"—designing, manufacturing and installing the specific type of system *best by test*—can you be sure of maximum safety.

So, we take all methods of fire alarm and control, combine them with extinguishing mediums—FIRE-FOG, Air Foam, Sprinklers, etc.—and compound the results by adding "Automatic" technical know-how as well as test and field experience. The result . . . the finest "Automatic" FIRE PROTECTION available at any price.

The subject is more vividly covered in our colorfully illustrated literature, "The ABC of Fire Protection." Write for free copy today.

"Automatic" Sprinkler
CORPORATION OF AMERICA · YOUNGSTOWN, OHIO
OFFICES IN PRINCIPAL CITIES OF NORTH AND SOUTH AMERICA

Flex Tester For Sheets

Stamping press operator can test sheets for drawability. Process takes less than a minute

PRINCIPLE behind hand bending of sheets by stamping press operators to measure drawability has resulted in the development of two non-destructive testing instruments.

Flex-Tester measures resistance to bending and gives an accurate forecast of the drawing quality of cold-reduced sheet and strip steel. Spherometer, which determines diameter of bend, indicates a material's susceptibility to stretcher strain during the draw.

Both instruments were developed by Jones & Laughlin Steel Corp., Pittsburgh, and are being marketed by Steel City Testing Machines Inc., Detroit.

Operation—Entire test takes less than a minute. Flex-Tester is used first. With it, operator bends back a corner of the steel sheet, and its resistance to bend is measured on a dial. For severe draws, for instance, 60 on the gage is the approximate dividing line between steel that can be drawn satisfactorily and that which might not take the draw.

FAST CHECK ON DRAWABILITY
. . . with flex tester, spherometer

This is a measure of ductility, translated into the probability of the breaking of the steel during the draw. Lower the resistance to the flexing force, the better the drawability of the steel and vice versa. To correct for sheet thickness, operator uses a micrometer, then refers to a conversion table.

Stretcher Strain — Spherometer measures diameter of bend. Smaller the diameter, the greater the tendency to stretcher strain. If diameter is three inches or greater, there will be no tendency to stretcher strain—degree of stretcher strain is proprotional to decrease of bend diameter. This knowledge can eliminate unnecessary roller-leveling to relieve strains or it can indicate when it is necessary.

Flex test can be used in warehouses and strip mills in addition to stamping plants. In strip mills, a series of tests can be made along the length of the strip at the temper mill. When the mill is stopped momentarily, an 8 inch slit is cut in the edge of the strip with a hand shear, and flex test readings taken.

Result, according to both J & L and Steel City Testing, is elimination of considerable rule-of-thumb work previously done by the operator.

Higher Ratio: *'Payload to Dead Weight'* with Differential Air Dump Cars

Differential design and construction skillfully combine greatest strength with lightest possible weight. Saves motive power, fuel, maintenance. Dead weight is an enemy of economy. *Differential makes the difference!* But that isn't all!

The automatic, either side dumping design — by **air** power is safer, faster — means still more economy. No matter what loose material there's 'more payload to dead weight' — more all around economy and lasting satisfaction in Differential Air Dump Cars.

Differential Products Include: Air Dump Cars, Locomotives, Mine Cars, Mine Supply Cars, Rock Larries, Mantrip Cars, Dumping Devices and Coinplete Haulage Systems.

DIFFERENTIAL STEEL CAR COMPANY

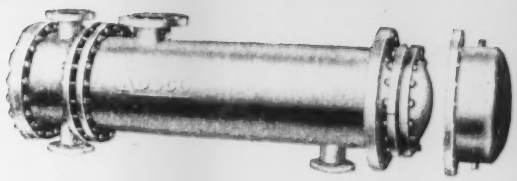
FINDLAY, OHIO

SINCE 1915 — PIONEERS IN HAULAGE EQUIPMENT

ADSCO ENGINEERED

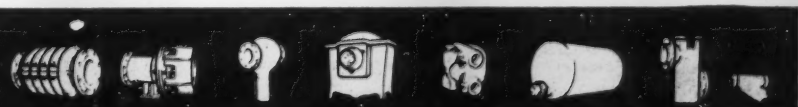
TO SOLVE ANY HEAT-EXCHANGER PROBLEM

Standard-design or tailor-made, ADSCO heat exchangers are engineered and manufactured to fit the exacting needs of ADSCO's industrial customers. Upon receiving a set of thermal conditions from a customer, ADSCO first applies its many years of experience to the design of the exchanger. And then into the manufacture goes all the know-how which ADSCO has acquired during its 75 years. The result is an exchanger which is not "almost right" but exactly right, a unit of the utmost efficiency... Investigate this specialized ADSCO service. You'll find it is low-cost, yet everywhere carries the ADSCO mark of quality which since 1877 has made ADSCO a leader.



A type of ADSCO heat exchanger widely used in industrial plants is the float-head, split-ring heat exchanger shown above. It is used for heating, cooling, or condensing, or for a combination of these. Shells can be of steel or a non-ferrous metal with either steel or non-ferrous tube sheets. Tubes of the removable tube bundle vary in size from ⅝" O. D. to 1¼" O. D. The pitch can be square or rectangular, depending on the fouling conditions and cleaning requirements. ADSCO heat exchangers are manufactured in conformity with ASME code for unfired pressure vessels.

ADSCO ENGINEERED PRODUCTS



Expansion Joints . . . Separators . . . Meters . . . Steam Traps . . . Heat Exchangers . . . Strainers

AMERICAN DISTRICT STEAM COMPANY, INC.

NORTH TONAWANDA, NEW YORK

Since 1877

Perma-tube Stops Rust

Vinyl coating applied in special process coats tubing inside and out. Good for outdoor jobs

VINSYNITE-VINYL system is being used to coat electric welded steel tubing to provide superior corrosion resistance.

Special dipping process is used to give the product, Perma-Tube, a double coating, inside and out. Vinsynite undercoating, a wash primer that phosphates steel and puts on a primer film, is the first step. Finish coat is a baked, aluminum-pigmented, vinyl-resin.

Tubing, a product of Jones & Laughlin Steel Corp., Pittsburgh, comes in 5 and 10-foot lengths, in several wall thicknesses. Applications include television antenna masts.

SIGNAL LOUD AND CLEAR
. . . no rust for a lifetime

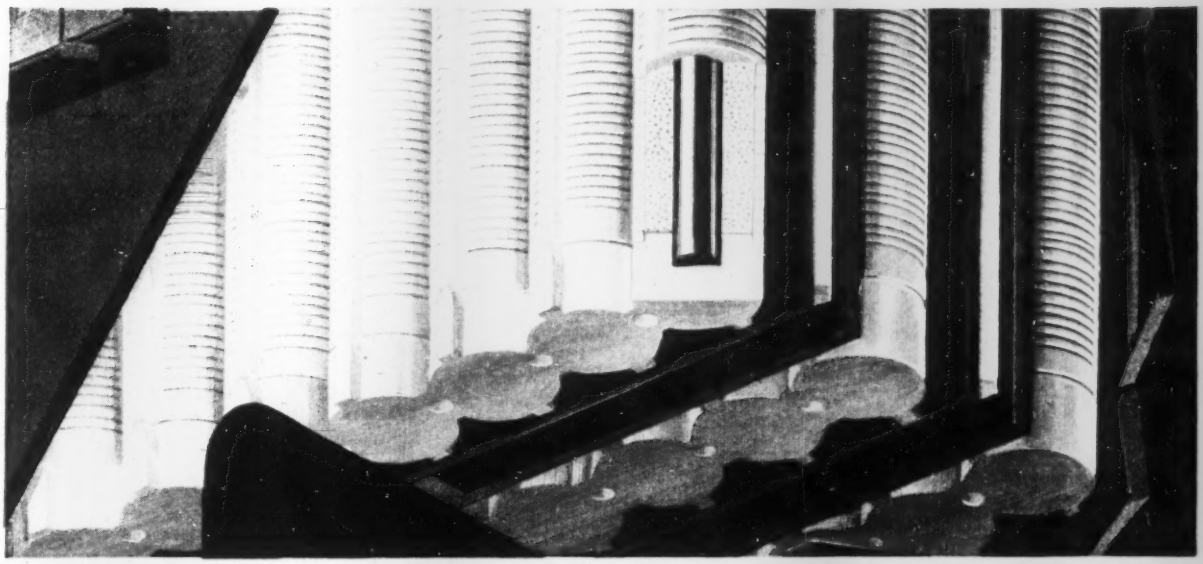
Corrosion—Combining strength, rigidity and lightweight, the material has excellent corrosion resistance. No corrosion appears on the surfaces after more than 1000 hours in accelerated, salt-spray tests.

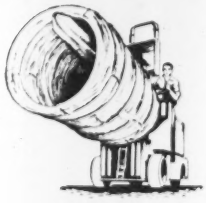
Similar results are obtained with the standard ASTM weatherometer test. After a period equivalent to more than five years of actual service, plastic coated tubing shows no signs of corrosion. One of the prime complaints of homeowners has been rust stains traceable to weathered TV antennas. There have been no such cases with Perma-tube.

For industrial trucks . . . Exide-Ironclad now offers

★ **20% more capacity in the same space**

★ **Lowest cost per A.H. to own and operate**





This cutaway picture shows the inside of the new T H EXIDE-IRONCLAD Battery.

Its larger positive plates, containing corrosion-resistant Silvium, are different . . . unique . . . exclusive! No other type of positive plate construction offers you the advantages of the T H Exide-Ironclad, with its slotted plastic tubes, permanently sealed on the bottom with polyethylene tube sealer. More active material is exposed to the electrolyte, resulting in greater power. More active material is retained, providing higher battery capacity for a longer working life. Other features include improved negative plates . . . practically indestructible Pormax separators . . . new sealing compound . . . shockproof molded jar . . . unbreakable quarter-turn vent plugs of plastic . . . corrosion-resistant tray coating.

All of the features of the new T H Exide-Ironclad Battery construction provide direct operating-hour savings for you.

Now-more than ever before...
YOUR BEST POWER BUY AT ANY PRICE!

1888... DEPENDABLE BATTERIES FOR 65 YEARS...1953

The new T H Exide-Ironclad BATTERY

Thrifty Hauler

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 2 • *Exide Batteries of Canada, Limited, Toronto*

"EXIDE," "EXIDE-IRONCLAD," "SILVIUM," "PORMAX" Reg. U.S. Pat. Off.

Protect your machinery's LIFE-LINE!

ELIMINATE VIBRATION

GUARD AGAINST LOAD SHOCK!

Specify LOVEJOY FLEXIBLE COUPLINGS

When you install Lovejoy Couplings, you guarantee your machinery the benefits of years of coupling design and engineering experience. You know that smooth, steady power transmission will keep your runout tables, conveyors, hoists, pumps and other production equipment operating at peak efficiency.

Note the compact, accurately machined bodies and jaws—the special cushioning materials—and you'll see why Lovejoy spells the end of your "down-time" worries . . . why misalignment, backlash, and surge are reduced to a bare minimum.

Lovejoy Couplings reduce maintenance time. Cushions are changed without shutdown. Lovejoy Couplings never require lubrication.

Write to us now for full technical data and engineering advice. Our illustrated catalog, with handy selector charts, is yours without obligation. Just forward your request.

LOVEJOY FLEXIBLE COUPLING COMPANY

5071 WEST LAKE STREET CHICAGO 44, ILLINOIS

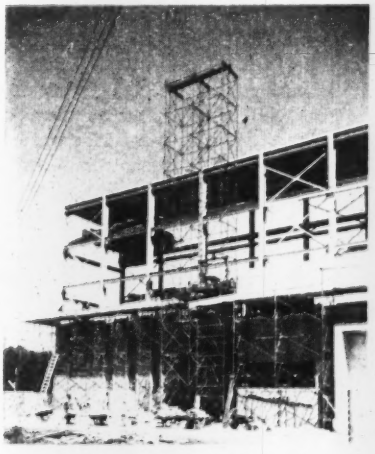
Manufacturers of Couplings, Universal Joints and Variable Speed Transmissions

Streamlining Construction

SMOOTH-WORKING material hoist tower is speeding work on Milwaukee's new incinerator plant. The medium duty hoist tower is 68 feet high, has proved invaluable in streamlining the material handling problem on this construction job. Tower is made by Safway Steel Products Inc., Milwaukee.

The double-hoist tower was erected in little more than one day. Because the tower is constructed entirely of high carbon tubular steel, it is strong and rigid. End frames, made up of six parts welded together, add rigidity and simplify handling of tower parts. End frames are joined by high carbon steel tubular bracing for strength. All metal parts are treated for corrosion resistance.

Capacity, Speed—The tower has a capacity of 3100 pounds per hoist. High strength is due to both tubular steel construction and arrangement of lower pulley assembly, which puts strains on the girder-like base section and not on supporting legs of the tower.



MATERIAL HOIST TOWER
. . . capacity: 3100 pounds per hoist

Lifting speed on the hoist tower is 160 fpm. Cage position can be controlled accurately to any level. Loads are placed on the cage platform from outside the guard rail and materials raised rapidly to desired levels and easily removed to work platforms on the outside of the building.

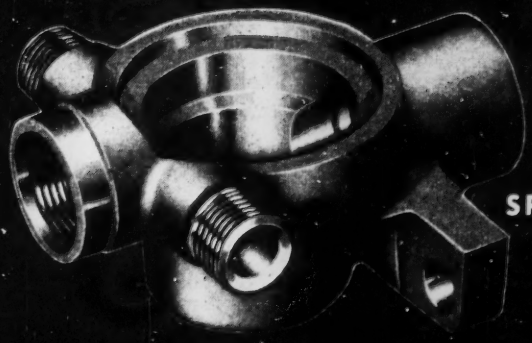
At the top of tower a cathead as-

MUELLER BRASS CO.

forgings

BRASS · BRONZE AND ALUMINUM

FORGED TO PERFECTION



PRECISION MACHINED TO YOUR SPECIFICATIONS

IT'S YOURS! NEW 32-PAGE FORGINGS ENGINEERING MANUAL. WRITE TODAY

MUELLER BRASS CO.

PORT HURON · MICHIGAN

112

IF YOU HAVE a production joining problem, bank on resistance welding and use the facilities of Taylor-Winfield. We have sales and application engineers who spend their time on specific customer projects.

If you will outline your needs, we will give you some practical help. T-W specializes in shirt-sleeve assistance on resistance welding. We design, engineer and build resistance welders into your production line. For prompt attention, address your inquiry to the nearest sales office.

Sales and Service

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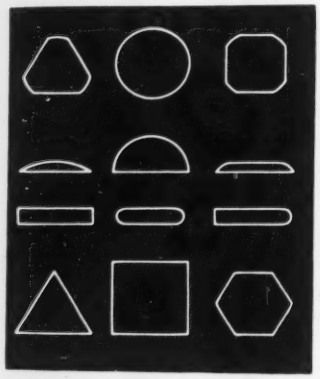
Resistance Welders Since 1898

TAYLOR-WINFIELD
RESISTANCE WELDERS

THE TAYLOR-WINFIELD CORPORATION • WARREN, OHIO

Shaped Wire Savings



Design possibilities of shaped wire offer cost cutting angles on many products. With the right job, shaped wire may eliminate machining operations and guarantee precision dimensions and finish. Flat wire and special shapes are drawn and rolled to specifications in a wide variety of alloys—monel, nickel, inconel as well as various grades of stainless steel.

Stainless flat wire is used to make film racks, eggbeaters, well screen, and vacuum filters. Some ten different parts of one photo camera consist of stainless flat wire and precision rolled special shapes.

sembly supports a 16-inch pulley wheel. Large wheel diameter protects wire threads in the cable and keeps the cable running free.

No Twisting, Binding—To eliminate twisting and strain on the cable, cathead pulleys are located low to provide a low center of gravity. Thus cable cannot bind on the sheave wheel and cable wear is kept to a minimum. On the lower end of the tower, swivel attachment that feeds cable in from the engine follows movement of cable and prevents binding.

The hoist tower is equipped with a cage safety device that stops the cage within inches of the point of cable trouble or failure.

Hoist tower used in constructing the Milwaukee plant is of double design. Two material hoists are joined together by common structural members

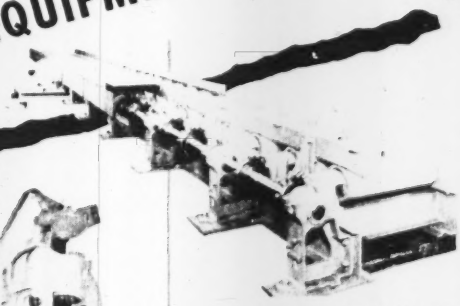
Hyde Park ROLLS

and ROLLING MILL EQUIPMENT

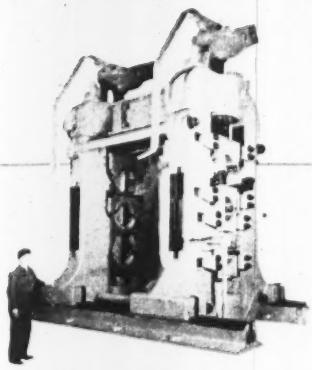
In many mills throughout the country Hyde Park Red Circle Rolls are daily giving top production, and achieving new endurance records.

The Hyde Park Red Circle is your assurance of quality and dependability. You will find it on the type and size of roll that will best serve your purpose.

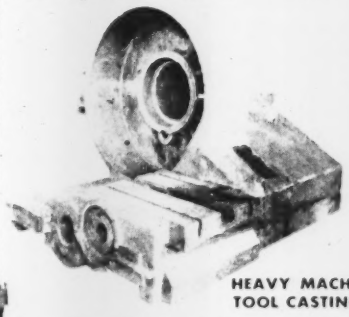
The same integrity of design and rugged construction are characteristic of all Hyde Park Rolling Mill Equipment.



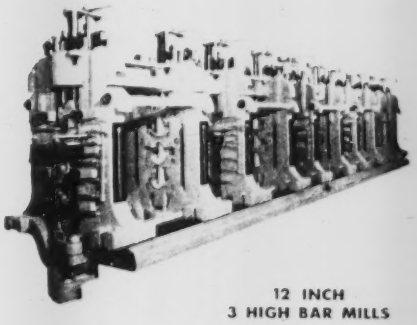
ROLLER TABLE



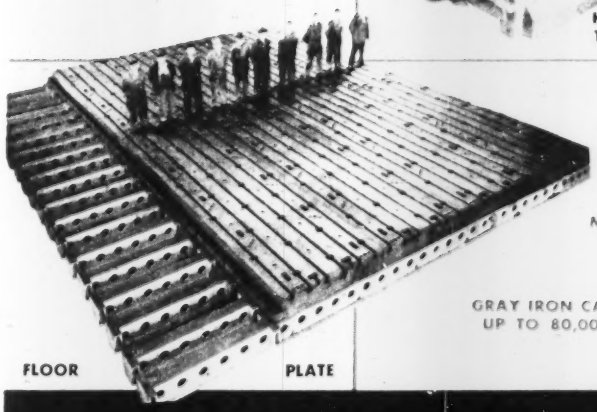
24 INCH
3 HIGH BAR MILL



HEAVY MACHINE
TOOL CASTING



12 INCH
3 HIGH BAR MILLS



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UP TO 80,000 LBS

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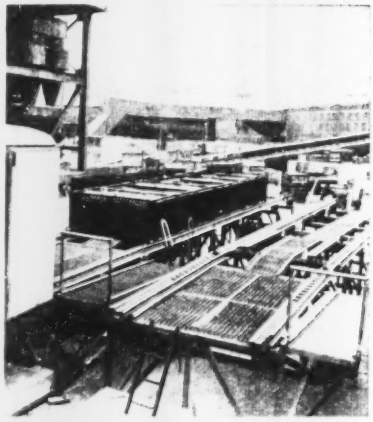
Hyde Park FOUNDRY & MACHINE CO.
HYDE PARK, WESTMORELAND COUNTY, PITTSBURGH DISTRICT, PA.

Conveyorized Handling

Fewer trucks move more material faster in transfer operations at nine Ford plants

MATERIAL HANDLING system which links widely separated plants by roller conveyors has been developed by Ford Motor Company. The system now is in use at nine Ford plants in the Detroit area and currently handles over 3400 tons of materials a day.

Conveyors are used for fast handling of a wide variety of automotive parts which normally are transported by company trucks from one plant to another in standard racks or standard skid bins. By conveyorizing the truck loading and unloading operations where a large volume of such parts must be moved, the company has discovered that time spent by trucks at dock-side is substantially reduced, fewer trailer trucks can handle a given quantity of material in the same time, and fork trucks are not tied up at both ends of the system in unproductive waiting.



Free standing conveyorized loading and unloading stations are capable of handling standard racks of parts

Three-Element System — With the Ford system a 30,000-pound load can be put aboard a trailer in ten minutes. As much as an hour and a half would be needed for loose-loading the same trailer.

The system consists of three elements. The first is specially constructed and equipped loading and unloading docks. Docks have roller conveyor tracks sloping 2 degrees down to the edge, and truck ramps sloping down at the same angle. Unloading docks and ramps are slanted in opposite directions. Second element calls for truck and trailer beds equipped with roller conveyor tracks the same size as those on the docks. Third, standard racks or bins are used for materials. Rack skid rails are attached flush with the feet, the same

Roller tracks on docks and on truck beds permit racks to roll off trucks to be moved away by fork trucks later

for ECONOMY—and EFFICIENCY

GRIPCO LOCK NUTS

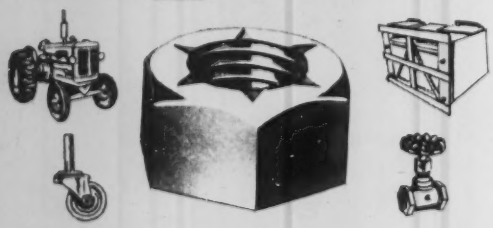
on FIRST cost

Simplified design makes possible much lower price

on APPLICATION cost

Fast Application cuts production time—and cost

DUPLICATE THE SAVINGS OF THESE GRIPCO USERS



One reason for Gripco Lock Nut Economy is that the locking action is inherent in the nut itself, and is produced by vertical thread deflection. No inserts, outside devices or extra height are required. Because of this simplicity, we can sell an efficient lock nut at a much lower price.

Because Gripco Lock Nuts are made to standard semi-finished full and jam dimensions, and eliminate the need for a lock washer, shorter bolts can be used. Write for samples and descriptive bulletin.

Another reason for Economy is speed in applying. Gripco Lock Nuts are started on the bolt like a common nut, then locked with a wrench.

**Clinch or weld nuts available with or without Gripco locking feature.*

NEW GRIPCO "CLINCH" NUT*

Hex-shaped pilot fits into hexagon hole in metal. Pilot is then flattened out clinching nut.

GRIPCO HI-NUTS

Eliminate leaf spring breakage due to broken or lost lock washers.

GRIPCO PILOT-PROJECTION WELD NUTS*

Circular pilot positions nut in bolt hole, for instant resistance welding.

GRIPCO COUNTERSINK WELD NUTS*

Gripco countersink feature allows cooling and solidifying of weld spatter before it contacts threads.

Write for Samples, mentioning Types and Sizes of nuts you use.

GRIP **NUT COMPANY**

308-N S. Michigan Ave., Chicago 4, Ill.

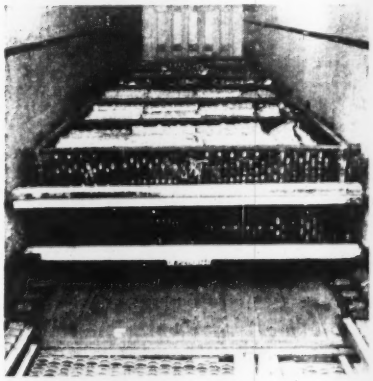
distance apart as the conveyor rails.

Loading, Unloading—To prepare for loading, completely filled standard racks are placed one at a time or in tiers by fork truck on the roller conveyors. A load of racks is ready for the truck when it arrives.

When the dock and truck conveyor rails are matched, the racks are allowed to roll into place in the truck. Locking devices on the truck's conveyor rails and sides prevent shifting of load while truck is moving.

To unload, the racks are rolled onto dockside conveyor rails for removal by fork truck. A hand-operated friction brake on dock conveyor rails slows racks as they roll out of trucks.

To insure matching with truck



Truck interior shows parts in racks locked in place. Conveyors on docks match those on floor of the truck

rails, end sections of dock conveyor rails are hinged and counterbalanced, and project several inches beyond the edge of the dock. When a truck backs into the dock, the dock rails can be raised or lowered and moved from side to side several inches to lock up to the truck bed rails.

More Installations — At Ford's Rouge, Highland Park and Mound Road plants, where outside storage space for racked parts is available, loading and unloading stations using the same conveyor principles have been erected.

At present, the company has 17 stations equipped with this idea in material handling. Twenty additional installations are being made in Detroit-area Ford plants. Forty-one Ford-owned trailer trucks, ranging in length from 26 to 40 feet, have all been similarly conveyor-equipped.

Pocket-Sized Chart

A decimal equivalent, tap drill and screw thread chart, printed on grease and dirt-resistant vinylite, will be sent on request without charge, to supervisors, foremen, machinists, tool engineers and draftsmen from Reiff & Nestor, Lykens, Pa., drill and tap manufacturing specialists.

This pocket-size chart lists fractions and decimal equivalents from 1/64 to 1 inch, by 64th's in a convenient order. On the opposite side are National Course and National Fine threads, pipe threads and A. S. M. E. standard and special threads with equivalent tap and body drill sizes for a wide range of sizes. Copies of the chart can be obtained free by writing the company.

Fiske "Magic" Compound

A Water Soluble Cutting Coolant

Fiske "MAGIC" Compound, when dissolved in water, cools, lubricates, produces a high finish and lengthens tool life. There is nothing else like it for milling, drilling, grinding, turning, sawing, threading, wire drawing and stamping. It is rust resistant, stays mixed and will not become rancid. Try it and see the improvement in your work.

There is a Fiske Lubricant for every metal-working operation. Each is an outstanding product and results in more production, better finish and increased tool life. Complete literature available. Write today to Fiske Brothers Refining Co., 123 Lockwood St., Newark 5, N. J., or 1504 Oakdale Avenue, Toledo 5, Ohio.

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Established 1870

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Quality control gages
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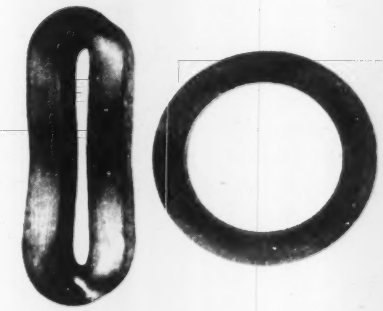
GAGES • MEASURING INSTRUMENTS • MACHINE TOOLS
CONTRACT SERVICES • THREADING TOOLS

Heavy Wall Pressure Tubes

Timken makes seamless tubes 10½ inches OD with 1.58-inch wall. Properties reported same

INCREASING temperatures and pressures in many industries are introducing changes in the design of the tubular members. Until recently it was common practice in steam stations to use a single line of 16-inch diameter pipe to conduct the steam from the boiler to the turbine.

With present steam temperatures of 1050 to 1100° F and pressures up to 2500 psi, this requires a very heavy wall thickness in order to conform to the maximum allowable stress in the tube wall. As a result it is often necessary to produce tubular members of this size by boring through large forged billets.



HEAVY WALLED SEAMLESS
. . . answer to high pressures

This is not only an expensive operation but also, in the case of the austenitic steel, whose grain size can not be readily controlled by heat treatment, the resulting properties are not always those desired.

Double Up—In order to overcome these handicaps, certain of the more recent steam piping installations have made use of two parallel rather than one single line. For a recent 1100° F, 2500 psi steam line, Timken Roller Bearing Co. furnished Type 347 tubes 10½-inch OD x 1.580-inch wall thickness.

Because of close control on the

✓ HYDRAULICALLY CONTROLLED POWER
✓ NO GEAR SHIFTING OR CLUTCHING DELAYS
✓ EFFORTLESS DRIVER CONTROL

From the first name in Mass Handling Equipment comes the last word in torque drives for fork lift truck applications. Here is a product of intensive research and engineering, truly a trouble-free torque converter drive . . . available to match the capacity range of all Towmotor power plants. Here is the one drive that adds still more to superior Towmotor performance. For the complete story in a nutshell, send for book on TowmoTorque now.

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We have a size and type, either quiet or standard, to fit your requirements.

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heating of tube billets, the rapid rate at which seamless tubes are pierced, and the thorough and uniform working during the piercing operation, the properties of the individual tubes can be held within the same close limits as in the smaller and lighter wall sizes.

Double Tests—With these particular Type 347 tubes, flattening and transverse tensile tests were taken on each end of each tube. Representative etched ring and flattened specimens are shown in the enclosed photo. Results from 38 transverse tensile tests showed the following average:

	Average
Tensile Strength	81,500
Yield Strength (0.2%), PSI	47,500
Elongation, %	46.5
Reduction of Area, %	57.5

These results indicate a high degree of uniformity from tube to tube.

The maximum outside diameter that can be produced is 10½ inches which is somewhat smaller than the 10¾ -inch OD corresponding to a standard 10-inch IPS. However, a large number of different wall sizes can be made for any given OD.

Seeing Is Believing

Shipping firms are more careful with packages if they can see what they are handling.

That theory has been put into practical working use by Electro Refractories & Abrasives Corp. in packaging its large-size crucibles.

A new method of packaging enables the company to ship crucibles which not only can be seen, but have a lighter shipping weight, are easier to handle and are less apt to be damaged en route.

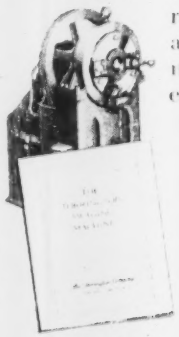
The Old and New—The old method was to pack crucibles in wooden crates, banded with steel and protected inside with packing material. Besides making for heavy shipments, this produced a sizable number of cracked or otherwise damaged crucibles.

The new system is simple. Crucibles are placed on solid wooden pallets with cross pieces protecting sides and top. Weight has been reduced almost half and shippers have handled the crucibles more carefully. Practically no damage has resulted.

the smith had the right idea

When it comes to forming metals, there's no substitute for the hammer. No other method gives metal equal toughness and resiliency.

The Torrington Swager operates on the same principle—delivering 4000 hammer blows a minute. It reduces, tapers and points rod, wire and tubing accurately and economically . . . using every ounce of stock.



Our booklet, "The Torrington Swaging Machine," gives full details on swaging and our complete line of machines. A free copy is yours for the asking

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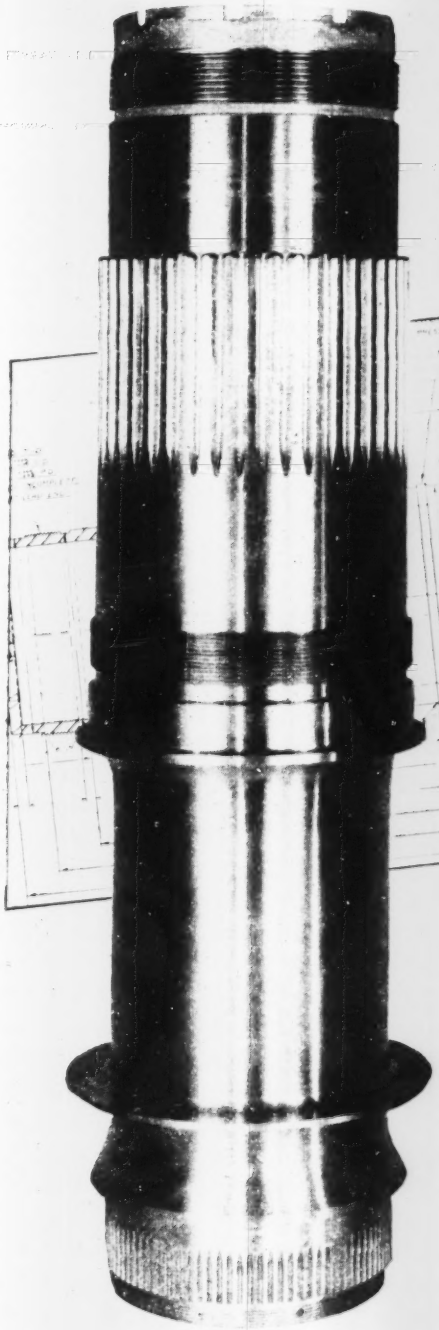
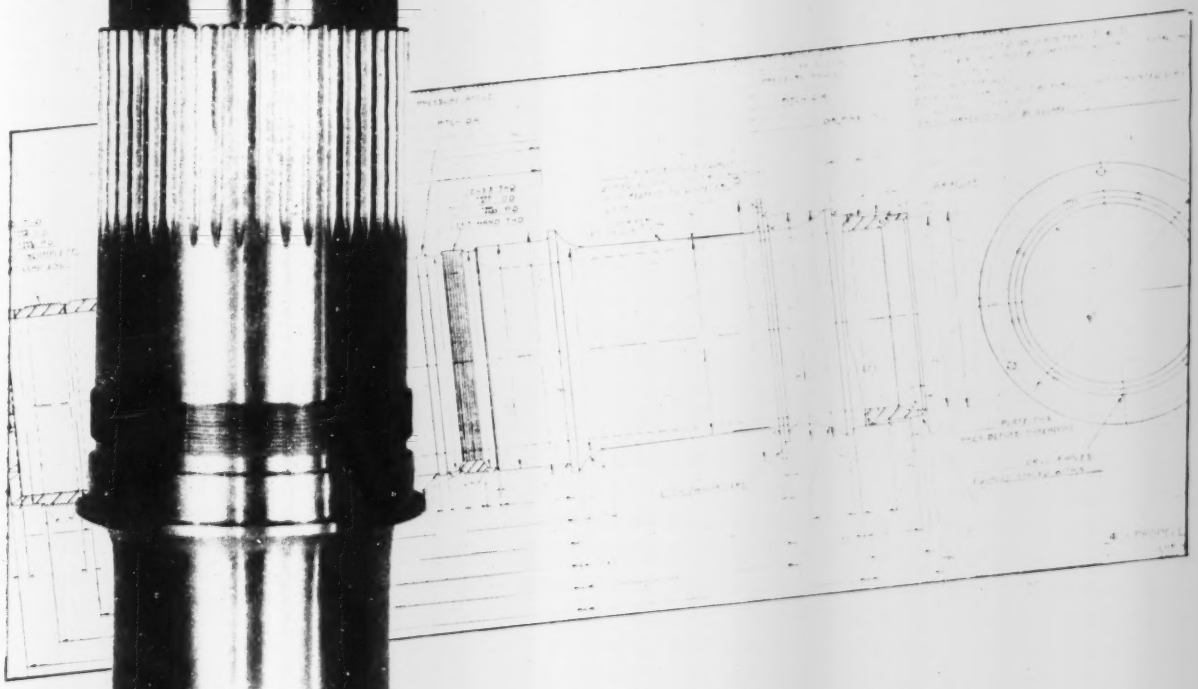
Makers of
TORRINGTON NEEDLE BEARINGS

Propeller Shaft Forgings Require Special Skills to Produce





Skilled metallurgists produce special electric alloy steel for these forgings at National Forge. The steel must have high resistance to fatigue, wear and shock. After rough machining and carefully controlled heat treating, these forgings are precisely machined to close tolerances by skilled machinists. The finished shafts are ready for installation.

These special skills were developed at National Forge through years of close cooperation with the aircraft industry. This has given National Forge a complete understanding of the quality requirements both in material and machining.

Why not put this experience and skill to work for you when next you need forgings? Write for full information.

NATIONAL FORGE AND ORDNANCE COMPANY

IRVINE, WARREN COUNTY, PENNSYLVANIA

"MULTI-CUT" "TUFCUT" "HOT WORK"

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SHEAR BLADES
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Any type or size blade of proper Alloy with correct hardness and temper for every type shearing machine and every kind of job.

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Every Wapakoneta blade is made to exact specifications, designed for the particular job. Complete records with order number of each blade makes possible duplication of exact size and temper at any time.

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Shear Blade Specialists Since 1891
Wapakoneta, Ohio

Hi-Strength Bolts Gain

More fabricators are discovering advantages in this method. Code changes will boost use

SELDOM has a newcomer to the fabricating industry enjoyed as wide acceptance and usage as high-tensile steel bolting of structural steel. No fastening method can claim to be the best; each has its own advantages and limitations. Yet high strength bolting can claim three distinct advantages.

Not only is it perhaps the fastest fastening method, high tensile bolted joints are stronger both statically and in fatigue. While bolt, nut and washers are more expensive initially, the finished bolted joint is less costly. Even further savings can be realized during additions or alterations. Bolts are removable and reusable.

How It Started—Years of work on the part of the Research Council on Riveted and Bolted Structural Joints has brought the development to the place it enjoys today, and their work is still continuing.

In shape, dimensions, and appearance, the high-tensile bolt is nothing more than a common bolt. It is used in its as-forged condition without any secondary machining operations and is assembled into a standard clearance hole, the same as used for rivets. Only thing that might distinguish it from a standard fastener is the semifinished machining given the underside of the bolt head and nut bearing face which facilitates truer bearing on the washer than would be the case with a rough nut and bolt.

The Physicals — Forged from medium carbon steel, the bolt is heat-treated to meet the requirements of ASTM specification A325. The requirements are high for instance, proof load is 85,000 psi for $\frac{3}{4}$-inch bolts and 78,000 psi for $\frac{7}{8}$ and 1-inch bolts. Ultimate breaking load is 120,000 psi.

In testing the ultimate strength of the bolt, a 10 degree bevelled washer is placed under the head. Even though subjected to this severe combination of tension and

TINNED--
FOR PROTECTION

...in preparing and processing foods...beverages... and petroleum products

Why are kitchen strainers, tea strainers, flour sifters, french fryers, automatic dish washer baskets and many other kitchen tools made of Reynolds *tinned* wire cloth?

Because tinning means resistance to rust and tarnish resulting from contact with milk, water and atmospheric gases.

Tinned wire cloth is also resistant to phosphoric acid, ammonia, carbon tetrachloride, etc.; and substances present in motor fuels and other petroleum products.

And, wherever high speed soldering is a factor—as in electrical products—Reynolds tinned wire cloth is a natural.

Whether your products are used in the kitchen, dairy, food processing and preservation, or the beverage, petroleum, or electrical industries—you'll be interested in Reynolds Wire Cloth. And, tinning is only *one* of the many special-needs demands that *Reynolds* Wire Cloth is or can be made to meet. Consult Reynolds engineers. No obligation.

Reynolds CLOTH

protects performance

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ATHENIA STEEL...*Clifton, N. J.*	Flat, High Carbon, Cold Rolled Spring Steel
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WAGNER LITHO MACHINERY...*Jersey City, N. J.*	Metal Decorating Equipment
WORCESTER WIRE WORKS...*Worcester, Mass.*	Round and Shaped Steel Wire, Small Sizes

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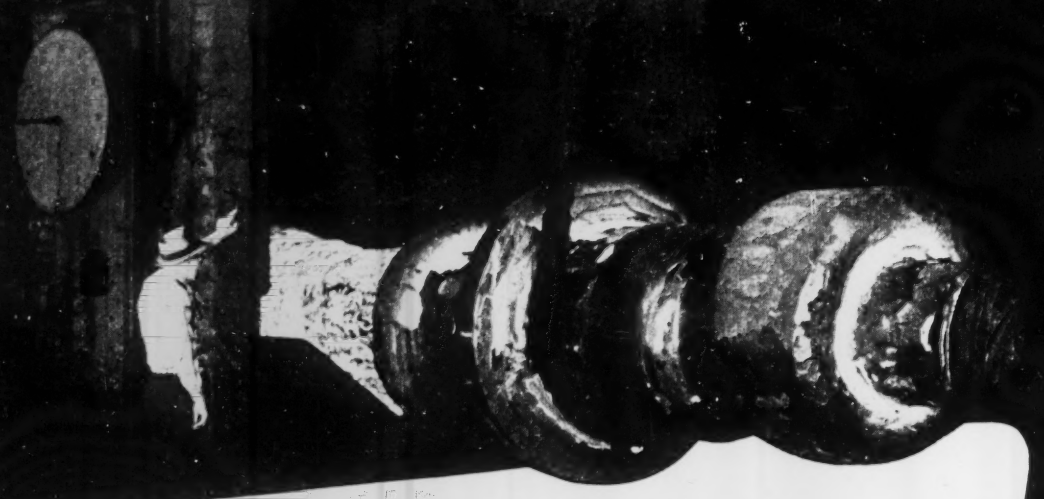
WHERE THE TOUCH OF PRECISION ...Measures The Future



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Ordnance & Armor

Seventy-five hundred tons of pressure under skilled hands . . . four weeks time . . . ten "soakings" for reheating . . . and a 513,000 pound ingot begins to take on the shape of a huge generator shaft. Heat treating, machining, testing and retesting follow in precision steps. The result . . . a masterpiece in steel for America's newest and largest dam . . . precision made by Midvale.

From furnace to finished product Midvale controls its quality throughout. Huge forgings, weldless gear rings, press cylinders, pressure vessels, hardened and ground steel rolls . . . Midvale makes them all. Modern equipment, complete facilities, skilled and experienced men assure you of products to your most exacting, precision specifications.

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MIDVALE
Custom Steel Makers to Industry
PRODUCERS OF FORGINGS, ROLLS, RINGS, CORROSION AND HEAT RESISTING CASTINGS

bending imposed by the wedge, bolt must still meet its required ultimate strength without breaking. Any bolt short of the specification just won't take this distortion.

Present Practice — Designing bolted joints is presently one of substitution—design for riveted construction, then use same-sized bolt for each rivet. By straight substitution, working loads are carried by friction alone. If, however, number of bolts is reduced

HI-STRENGTH BOLTS
. . . quick way to save

by one-third to take advantage of higher shear strength in the bolts, the load can be carried by some combination of friction and shear.

In assembling a bolted joint, the prime objective should be to tighten the bolt to induce a load well beyond its recommended preload value. This value is currently 90 per cent of the proof load. This is a minimum. Actual bolt tension may be greater. Joints with bolts stressed beyond their yield point will carry just as much static or fatigue load, and bolts are not weakened by this overtightening as has been demonstrated many times.

Stronger in Fatigue — Fatigue strength must be evaluated two ways—fatigue of bolt and bolted material. Properly tightened bolts will not fail in fatigue since initial

SPECIFY
HERC-ALLOY
SLING CHAINS

Write for Data Book

HERC-ALLOY
Sling Chains are registered by individual serial number and can be rebuilt or replaced at any time to original specifications.

The Allegheny Ludlum Steel Corp., pictured above, uses Herc-Alloy Sling Chains for hundreds of tough lifting jobs in its plants. In addition to maximum safety, Allegheny Ludlum also enjoys the extra economy of longer-lasting Herc-Alloy. These sling chains offer still another advantage...a weight reduction unmatched by any other alloy chain without any sacrifice in tensile strength. This reduces worker fatigue. All things considered, don't you think Herc-Alloy Sling Chains are worth a try in your plant.

CM HOISTS AND CHAIN

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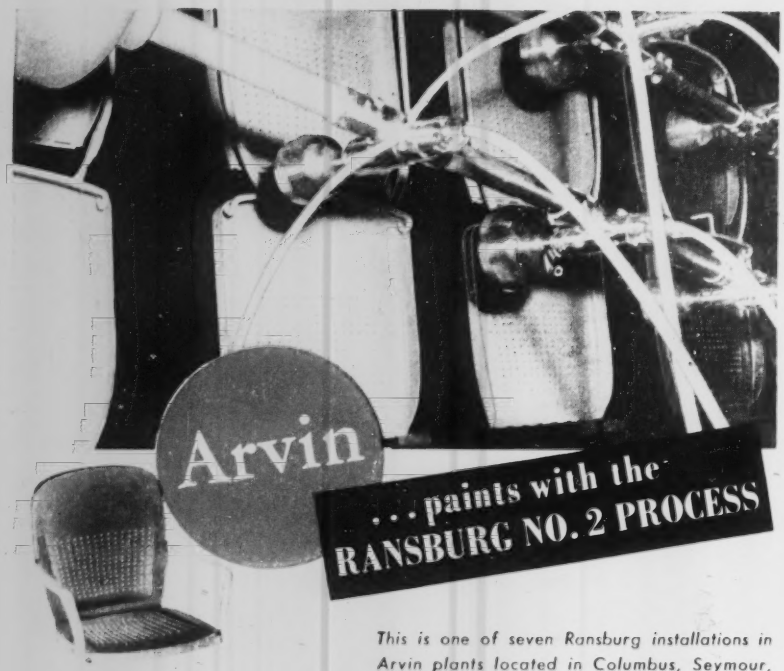
TONAWANDA, NEW YORK
DISTRICT OFFICES: NEW YORK, CHICAGO, CLEVELAND



This is one of seven Ransburg installations in Arvin plants located in Columbus, Seymour, Greenwood, North Vernon and Franklin, Indiana.

When Arvin chair seats and chair backs were redesigned to be perforated with hundreds of little holes in each piece, the former dipping method of coating was unsatisfactory. Here are other reasons why RANSBURG NO. 2 PROCESS was selected to do the finishing job:

1. **Simplicity and rapidity with which colors may be changed without slowing production.**
2. **Less floor space required.**
3. **Provides improved quality with no variance in the required 7/10 mil film thickness.**
4. **Former maintenance and clean-up time reduced to a minimum.**

No savings in paint cost were anticipated. However, the RANSBURG NO. 2 PROCESS—in providing the above, desirable advantages—still enables Arvin to reduce finishing costs 10%. And, that over dip coat!

Want to know more about production efficiency of the NO. 2 PROCESS as it applies to YOUR production? Write for literature showing a variety of typical production installations in factories all over the country.

RANSBURG

Ransburg ELECTRO-COATING CORP.

INDIANAPOLIS 7, INDIANA

Copper-coated Wire

Wherever strength is important and some conductivity can be sacrificed, it may be advisable to use copper coated steel wire instead of weaker copper wire.

Process developed by National Standards Co., Niles, Mich. deposits copper on steel wire without impairing tensile strength of the wire. Electrical conductivity of "Copperply" product is up to 22 per cent of the conductivity of copper. This conductivity is sufficient for some uses. Copper is conserved in scarce times.

Range of sizes of copper coated wire is 0.025 to 0.180-inch diameter. Finer sizes are available from concerns who buy Copperply for redrawing. Copper coated wire is also woven into industrial wire cloth.

bolt tension will stay relatively constant until external tension load on the joint exceeds the bolt load. In no carefully designed connection of any type would the designer permit the calculated service load to be greater than the high bolt preload. Thus the bolt receives no appreciable stress variation, without which there can be no fatigue failure.

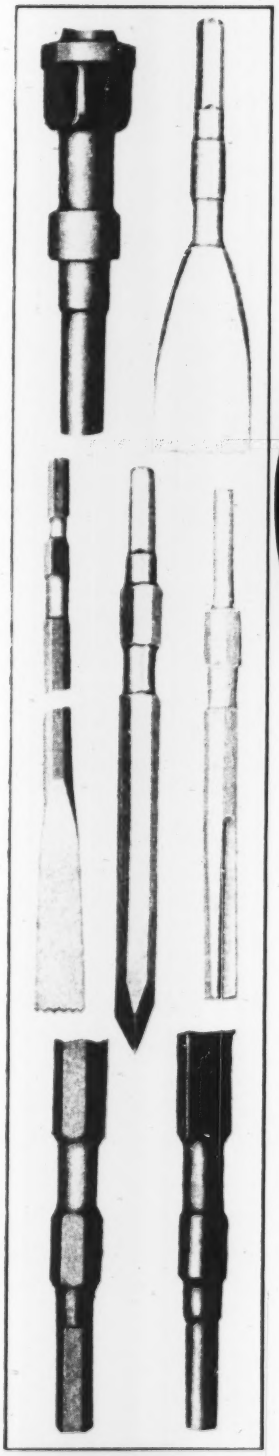
Per unit of strength, bolted joints are the cheapest. With further economies envisioned as a result of code revisions to take full advantage of high strength bolt characteristics, this joining method can hardly be overlooked as an important tool in our cost-trimming economy.

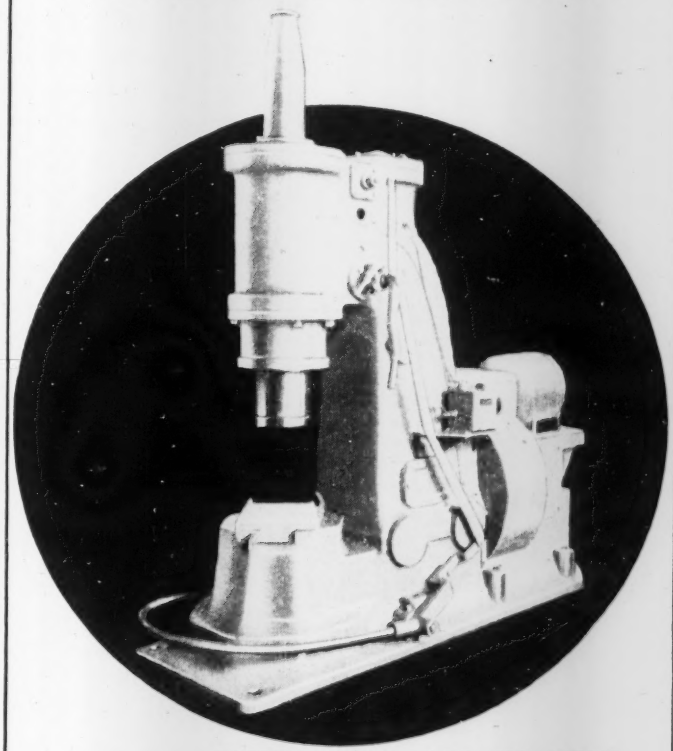
Nonsparking Tools

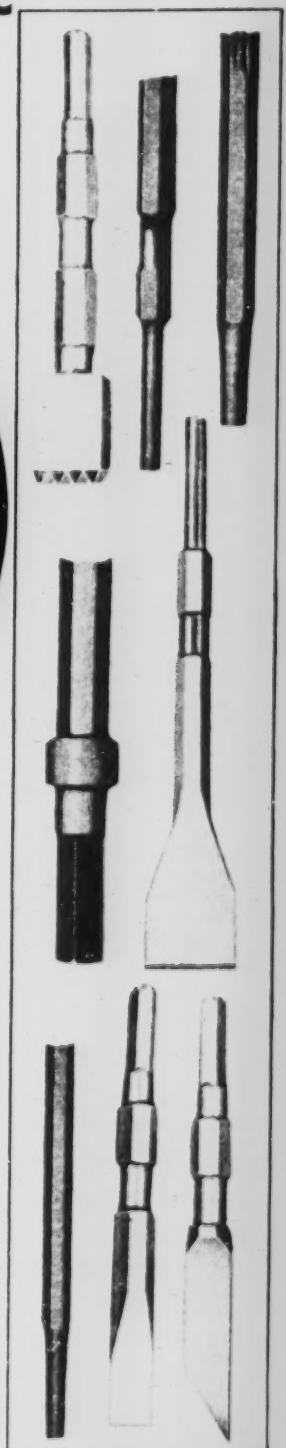
Advantages of beryllium copper tools as safeguard against accidental fire or explosion caused by sparks are described in an illustrated folder just issued by Beryllium Corp., Reading, Pa.

A feature of beryllium copper the folder points out, is its nonsparking property, making it safer than steel for use around explosives or in other places where a tool spark might cause disaster.

WORLD'S LARGEST MANUFACTURER OF PORTABLE ELECTRIC HAMMER TOOLS...







USES THE VERSATILE, ALL-IN-ONE NAZEL ELECTRO-PNEUMATIC HAMMER

Yes, the Black & Decker Manufacturing Company makes all its hammer tools on two versatile NAZELs, one Type 2B and one Type 3B. Tools such as those shown are forged to volume production standards of from 480 pieces to 1,920 pieces in an 8 hour day.

Flats, flutes, tapers and square nuts present no problem . . . tolerances are so close that, except for grinding, no further machining is necessary. The world's most widely used Electro-Pneumatic Hammer does a big, time-saving, money-saving job for the world's largest producer of hammer tools . . . and, every large user of tools can obtain the same benefits as this tool manufacturer . . . the easy-to-operate NAZEL will eliminate YOUR expensive tool manufacturing or tool dressing headaches, too!

Complete information in the NAZEL HAMMERS Catalog . . . yours for the asking

1836

LOBDELL UNITED COMPANY

WILMINGTON 99, DELAWARE

A SUBSIDIARY OF UNITED ENGINEERING AND FOUNDRY COMPANY

1953

Super-Thin Metal Sheets

Electrical alloys are rolled so thin it takes 10 sheets to equal the thickness of cellophane

METAL STRIP rolled so thin that it takes ten sheets to equal the thickness of an ordinary piece of cellophane is suddenly becoming of great importance in an industry accustomed to thinking in terms of battleship plate.

Why the new emphasis? It has been discovered that electrical alloy steels rolled to minute thickness and made into tape cores show electrical properties so unusual that they can replace vacuum tubes in complex electronic equipment, such as memory devices and digital computers. Cores for specialty transformers is another large market.

Few Capable — Cold rolling is generally produced to certain thicknesses with tolerances of ±0.0005 inch applicable in sheet above 0.002 inch in thickness. When rolling 0.002 or under, very fine tolerances are required and ±0.0001 inch is regarded as commonplace.

Radiation gages enable Arnold to roll strip below 0.0009 inch on the mill

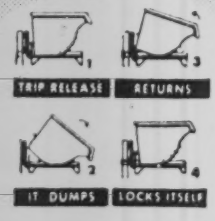
It is estimated that there are only a half-dozen companies in the U. S. that can produce 0.002 to 0.0005 inch strip to these fine tolerances. At 0.0005 and under, there are about two companies that can roll to these thicknesses without "rolling tricks". One of the two, Arnold Engineering Co., Marengo, Ill. has had over a year's experience in producing a variety of ultra thin strip.

Tiny Mill—Rolling materials of so fragile a nature has created a whole new set of problems for Arnold, a subsidiary of Allegheny-Ludlum. Their "pocket rolling mill," which could fit into your living room with space to spare, is a cluster-type mill developed by Sendzimer.

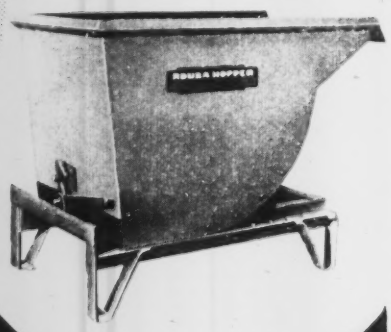
The mill is 20 rolls high—to prevent bending of the work rolls, which are only ¼ inch in diameter and six inches long. Mill will handle strip up to 4⅛ inches in width. After much experimentation with various types of rolls, Arnold has found carbide work rolls to be the most satisfactory.

How to Measure?—Big problem of how to accurately measure strip rolled to less than .001 inch was solved with the installation of two AccuRay beta gages to measure before and after each pass. Manufactured by Industrial Nucleonics Corp., Columbus, O., the beta gages utilize radioactive isotopes to

Reduce Your Product Cost with...
ROURA Self-Dumping HOPPERS
—they pay for themselves



Only ROURA Has The Exclusive PATENTED Instant Release Handle



Meaning more than selling any one job are the business principles that stand behind a product's manufacture — quality construction is foremost with Roura Hoppers.

Long-lived Roura Hoppers have submerged arc wells — they are "stitched" with the same apparatus used for "stitching" high pressure steam boilers.

Handling wet or dry, hot or cold, bulky materials quickly and easily, the ROURA is simple to operate—only one man is required for distributing and unloading—and he does this in much less time than ordinarily required under old-fashioned manual methods. Thousands of Roura Hoppers (which fit any standard fork or platform lift truck) are in constant daily operation, serving and saving for such firms as Owens-Illinois Glass, Corning Glass, National Fireproofing, General Motors, Ford, Chrysler, American Brake Shoe, General Electric, Westinghouse, Western Electric, American Steel Foundries, International Harvester, John Deere, etc.

By a simple lift of the exclusive release handle, the ROURA HOPPER dumps, rights and locks itself securely. Sizes—½, ¾, 1, 1½ and 2 cubic yards; the ROURA HOPPER can also be designed for flat trucks and in other sizes to meet specifications. Also, it can be equipped with special flanges that permit stacking to desired tiers for storage or future distribution of materials—conserving valuable floor space. Priced below all competition, the ROURA will quickly pay for itself many times over.

SIMPLE
SAFE
SPEEDY
MATERIAL HANDLING

—Can Be Coated With Acid-Resistant Paints

Write today for detailed brochure, "In Dollars & Sense."

ROURA IRON WORKS, Inc.
1421 Woodland Ave. Detroit 11, Mich.

measure strip without contacting it.

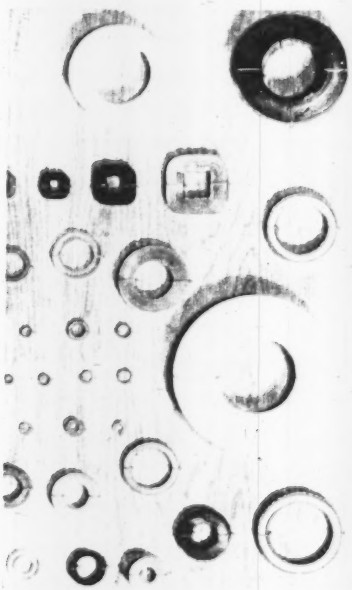
Accurate to an amazing degree, the gages automatically compensate every half-hour for changes in temperature, humidity, dust collection on radiation windows, and other external conditions. Readings are penned on strip chart recorders, presenting a visual guide to the operator. In addition, repeat meters on the general instrument panel are used to show plus or minus deviations.

Procedure — General operating procedure is for a new coil to be rewound accurately, cleaned, and then placed on the mill. Operator then makes a skin pass to first determine the general characteristics of the coil. Readings on the Accu-Ray chart are valuable in showing extreme thickness variations which, if not taken into account during following passes, might result in coil breaks.

Because of the tissue-thinness of the strip, coil breakage is a problem. Special lubricating oils, accurate tension control, and air conditioning equipment to keep atmospheric conditions constant are a must for this type of rolling. Breaks are welded electrically whenever it is feasible.

Some Even Thinner—Arnold has rolled some strip to less than 0.0001 inch. The fragile strip can be torn very easily when it comes off the mill; thus, much care is exercised in handling the coils. Arnold slits the material and winds the cores on ceramic bobbins before the cores are further processed. Other types of cores are encased in plastic containers for protection.

For electronic instruments, two classes of nickel-iron alloys are generally used, 50 per cent nickel and 80 per cent nickel. Other metals include beryllium copper, nichrome, phosphor bronze, silectron (grain oriented silicon steel) and stainless steel.



Special alloy strip is used in tape cores which are replacing vacuum tubes

V-8 Manifolds—230 Per Hour

Right and left V-8 engine exhaust manifolds are machined on a new Transfer-matic-type machine tool just announced by Cross Company, Detroit.

With parts automatically transferred from station to station, machine performs 42 milling, drilling, boring, chamfering and tapping operations. Exhaust manifolds are finished at the rate of 230 (115 right and 115 left) per hour at 100 per cent efficiency.

GLOBE

Specialization gives you "Tops in Quality"

ALLOY STEEL TUBES

SEAMLESS—MECHANICAL—PRESSURE—CORROSION-RESISTANT

TYPICAL ANALYSES:

Carbon
Carbon ½ Moly
½ Chrome ½ Moly
1 Chrome ½ Moly
1¼ Chrome ½ Moly
2 Chrome ½ Moly
2¼ Chrome 1 Moly
5 Chrome ½ Moly
7 Chrome ½ Moly
8 Chrome ½ Moly
8 Chrome 1 Moly
9 Chrome 1 Moly
3½ Nickel - 7½ Nickel
5½ Nickel - 9½ Nickel

AISI Types: 304-321-347-316-309-310-405-410-430-446-416

Analyses to meet conditions where heat, corrosion, pressure and structural strength are involved.

SIZE RANGE—WALL THICKNESS:

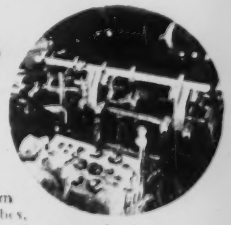
½ to 6 inches O.D. — wall thickness .035 to 1.000 inch.

TYPICAL APPLICATIONS:

Pressure tubes — Superheater tubes — Condenser tubes — Still tubes — Evaporator tubes — Barrel tubes — Oil-well Pump Barrels — Mechanical tubes — Aircraft tubes — Propeller tubes — Rollers for Transmission Chains.

Globe engineers gladly give you the benefit of specialized knowledge of stainless steel tubing in a wide range of services and applications — to improve your product — to cut costs.

The heating, piercing, rolling of seamless tubes is controlled at every step for uniformity, close tolerance.



WHEN you specify Globe, you get uniform high quality alloy steel tubes, the product of highly developed production facilities and specialized quality controls and methods. All Globe tubes are thoroughly inspected and closely held within tolerance specifications. Write for the Globe general catalog.

TO BE SURE... SPECIFY GLOBE

GLOBE TUBES

GLOBE STEEL TUBES CO. MILWAUKEE 46, WISCONSIN

Chicago • Cleveland • Philadelphia • St. Louis • New York • Detroit
Denver • Houston • San Francisco • Glendale, Cal.

Producers of Globe seamless stainless steel tubes — Globeld stainless steel tubes — alloy — carbon — seamless steel tubes — Globeiron (high purity ingot iron) seamless tubes — Globe Welding Fittings.

STANDARDS and SPECIALS by the Millions

THE FERRY CAP & SET SCREW CO.

2159 SCRANTON ROAD • • • CLEVELAND 13, OHIO

"SHINYHEADS"

America's Best Looking Cap Screw

Made of high carbon steel — AISI C-1038 — to standards for Full Finished hexagon head cap screws — bright finish. Heads machined top and bottom. Hexagon faces clean cut, smooth and true, mirror finish. Tensile strength 95,000-110,000 p. s. i. Carried in stock.

"HI-CARBS"

Heat Treated Black Satin Finish

Made of high carbon steel — AISI C-1038. Furnished with black satin finish due to double heat treatment. Hexagon heads die made, not machined. Points machine turned; flat and chamfered. Tensile strength 130,000-160,000 p. s. i. Carried in stock.

"LO-CARBS"

Made of AISI C-1018 steel — bright finish. For use where heat treatment is not required and where ordinary hexagon heads are satisfactory. Hexagon heads die made to size — not machined. Points machine turned. Tensile strength 75,000-95,000 p. s. i. Carried in stock.

SET SCREWS

Square head and headless — cup point. Case hardened. Expertly made by the pioneers in producing Cup Point Set Screws by the cold upset process. Cup points machine turned. Carried in stock.

FILLISTER CAP SCREWS

Heads completely machined top and bottom. Milled slots — less burrs. Flat and chamfered machined point. Carried in stock.

FLAT HEAD CAP SCREWS

Heads completely machined top and bottom. Milled slots — less burrs. Flat and chamfered machined point. Carried in stock.

"SHINYLAND" STUDS

All studs made steam-tight on tap end unless otherwise specified, with flat and chamfered machined point. Nut end, oval point. Land between threads shiny, bright, mirror finish. Carried in stock.

ADJUSTING SCREWS

Valve tappet adjusting screws — Hexagon head style — to blue print specifications — hexagon head hard, polished if specified — threads soft to close tolerance — points machine turned, flat and chamfered.

CONNECTING ROD BOLTS

Made of alloy steel — heat treated — threads rolled or cut — finished to extremely close thread and body tolerances — body ground where specified. Expertly made by the pioneers in producing connecting rod bolts by the cold upset process.

SPRING BOLTS

Case hardened to proper depth and ground to close tolerances. Thread end annealed. Supplied in various head shapes, with oil holes and grooves of different kinds, and flats accurately milled.

FERRY PATENTED ACORN NUTS

For ornamental purposes. Steel insert — steel covered. Finish: plain, zinc plated, cadmium plated. Size: 9/16", 3/4", 15/16" across the flats. Tapped 1/4" to 3/4" inclusive.

Cross section of Ferry patented acorn nut, showing how steel hexagon nut fits snugly into shell.

Pioneers and Recognized Specialists, Cold Upset Screw Products since 1907

STANDARDS carried by LEADING DISTRIBUTORS

* SPECIALS furnished to BLUE PRINT SPECIFICATIONS

WRITE FOR INFORMATION

SEND FOR SAMPLES

New Developments in Lead

Lead-clad linings and lead-bonded materials show gains, as do construction methods

CHEMICAL construction continues as the major domain of unalloyed lead, although further gains are being made in its use as bricks, sheet and castings for protection against radiation.

Wider applications are being found for bonded or lead-clad linings and lead-clad linings in combination with acid-resistant brick. Anodizing of aluminum has been speeded up through use of lead-covered, copper cooling coils, which contain freon.

Better Batteries—In the alloy field, work is still focused on improvement of battery grid alloys.

EASY WAY TO LEAD-LINE
. . . studs anchor the straps

Goal: Higher-capacity, longer-lasting batteries without increase in size. Several proprietary alloys have been introduced. Most involve addition of small percentages of copper and silver (and sometimes tellurium).

Progress in construction: Lead welding machine, recently patented, offers promise in lead cladding. Automatically welded studs are fastening straps in sheet-lead lined vessels. Cartridge-powered stud drivers are applying lead linings in x-ray rooms and fastening straps to lead lined vessels.

Progress in testing: Dye and fluorescent penetrants are successful in detection of surface discontinuities in lead welds and linings.

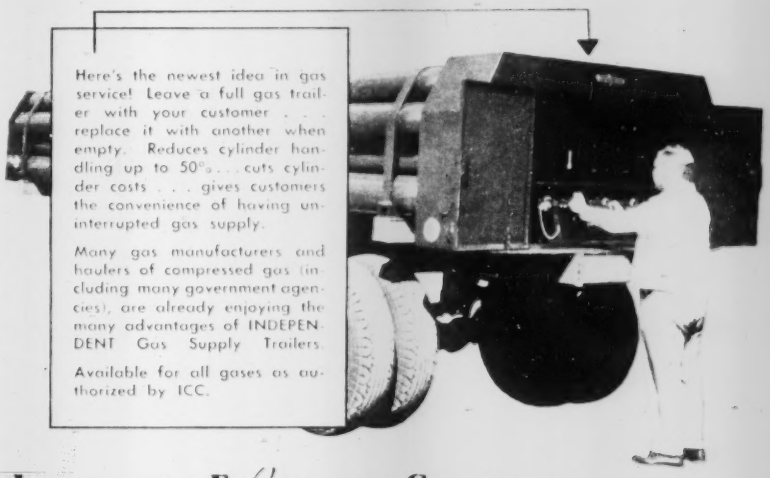
REDUCE CYLINDER HANDLING

Up to 50% with INDEPENDENT Gas Supply Trailers!

Here's the newest idea in gas service! Leave a full gas trailer with your customer . . . replace it with another when empty. Reduces cylinder handling up to 50% . . . cuts cylinder costs . . . gives customers the convenience of having uninterrupted gas supply.

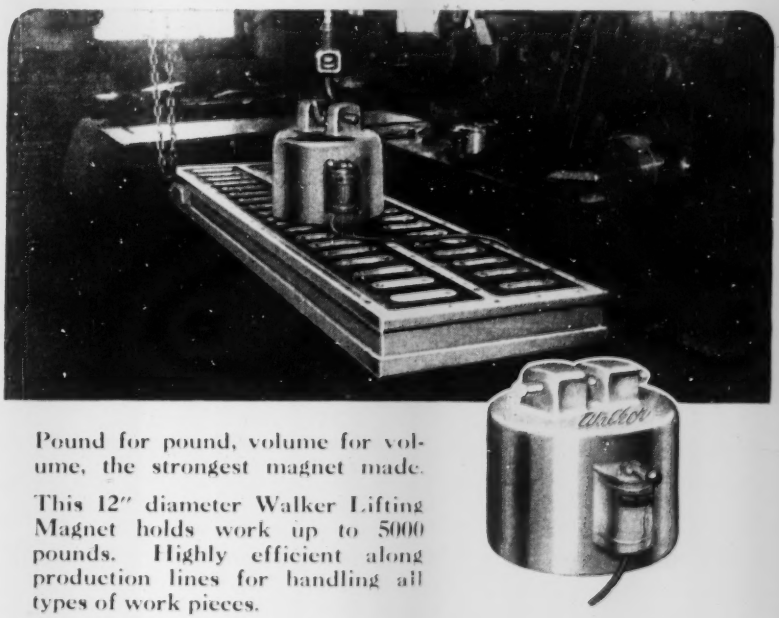
Many gas manufacturers and haulers of compressed gas (including many government agencies), are already enjoying the many advantages of INDEPENDENT Gas Supply Trailers.

Available for all gases as authorized by ICC.



INDEPENDENT ENGINEERING COMPANY, Inc.
CONSULTING · RESEARCH · DESIGNING
Manufacturers of
CYLINDERS AND GAS PRODUCING EQUIPMENT
ACETYLENE · OXYGEN · HYDROGEN · NITROGEN
O'FALLON 6, ILLINOIS

We Invite Your Inquiries



Pound for pound, volume for volume, the strongest magnet made.

This 12" diameter Walker Lifting Magnet holds work up to 5000 pounds. Highly efficient along production lines for handling all types of work pieces.

The Walker line includes contoured lifting magnets increasing the area of contact for special applications (for wire, pipe, etc.). Your lifting problems can be solved by Walker.

Original Designers and Builders of Magnetic Chucks

O. S. Walker Co., Inc. • Worcester 6, Mass.

WHEN IT COMES TO

SPECIALTIES

COME TO

WALLINGFORD

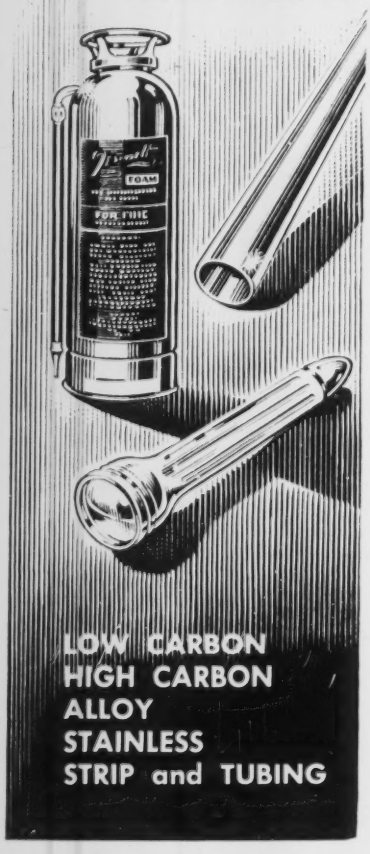
FOR THE

Stainless

STEEL

Strip

Cost-Minded
Production
MEN
Specify
Wallingford Steel
because . . .
They Know It
Gages Uniformly,
Is Correctly Tempered,
Draws Easily,
Punches Cleanly
and
Lot after Lot
is a
Consistently Dependable
Product
Available
.002 and heavier



LOW CARBON
HIGH CARBON
ALLOY
STAINLESS
STRIP and TUBING

THE
WALLINGFORD
SINCE 1922
STEEL
CO.
WALLINGFORD, CONN., U.S.A.

Carbide Hacks Costs

SUBSTANTIAL SAVINGS in equipment costs in addition to elimination of much down time for changing machine components were recently secured at Henry G. Thompson & Son Co., New Haven, Conn. plant by switching from an oil-hardened tool steel feed ratchet to one made of tungsten carbides.

Operators of the above plant, known for the manufacture of a line of profile, band and saw blades, reported last week that their 1-inch diameter, 10-pitch Kennametal carbide ratchet is outlasting more than 60 of its tool steel contemporaries.

Operation Story — Band-saw stock is fed at a pre-set rate by means of a ratchet through carbide setting dies which produce the desired set in the saw teeth. Steel

SAW BLADES HARD ON RATCHETS
. . . carbide outlasts all others

stock is payed-off one reel in a vertical position with teeth up, through the setting dies, and onto a take-up reel. The feed ratchet—driven through a gear train—is synchronized with the setting die to assure the proper feed cycle for a correct saw tooth set.

Since the ratchet maintains continuous contact with the steel saw stock, any excessive wear on its teeth results in improper feed and scrapped saw stock.

Outlasts Steel—Their previously used oil hardened steel ratchets were usable for feeding a maximum of 100,000 feet of stock. One carbide ratchet, at time of last report, had fed 6 million feet and was still in excellent operating condition. This amount of production would have required the use of at least 60 steel ratchets.

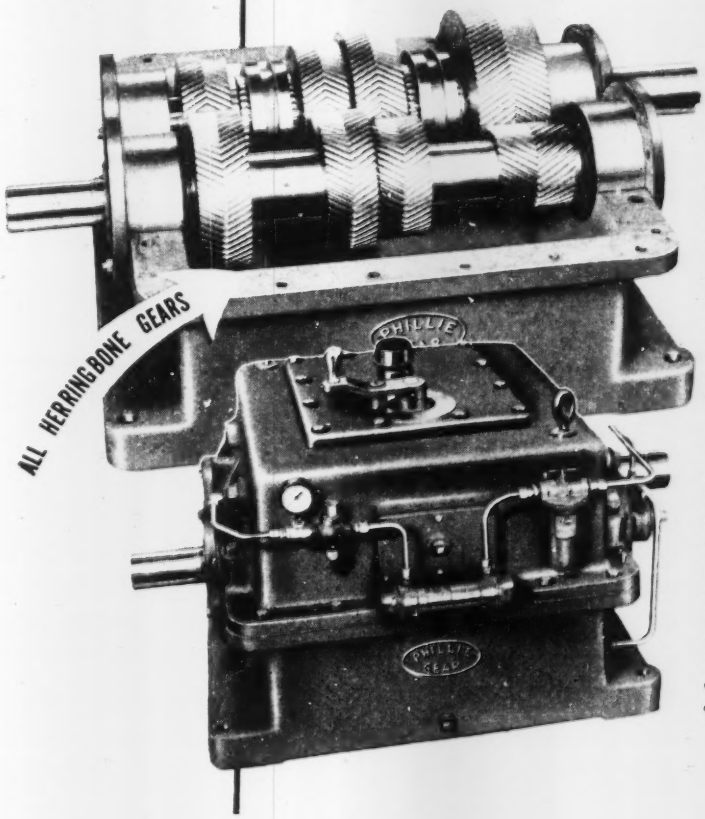
Now Available...

a Change-Speed Unit

2, 3 or 4 Speed Combinations

Wide Range of Ratios

For Speed Reduction, Speed Increasing, or a combination of both

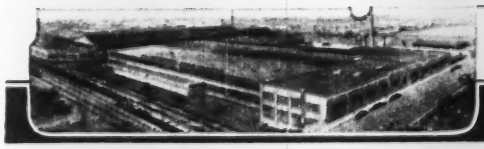


Industry has long needed a standardized Change Speed Unit, designed and built to *eliminate* the high cost and delayed delivery of *specially built* units.

Philadelphia Gear is now able to offer a line of these units, backed by 20 years of knowledge and experience in the building of Change Speed Units constructed to individual specifications . . . Hundreds of these Units are today in successful operation.

These new Philadelphia Standardized Units are positive, reliable Geared Drives, using Herringbone Gears throughout,—and they provide definite ratios of Speed Reduction, Speed Increasing, or a combination of both. There are no belts to wear out and cause speed variations. They are available for a wide range of horsepowers, and in 2, 3 or 4 Speed Units (photos show a 4 Speed Unit).

A new Catalog CSU-52 illustrates and describes these Units in detail. Send for a copy.



ERIE AVE. AND G ST., PHILADELPHIA 34, PA.

NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.

Industrial Gears and Speed Reducers
LimiTorque Valve Controls

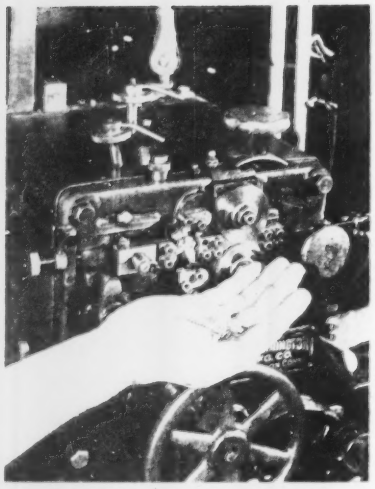
Rust Resistant Spring Alloy

Elgiloy, spring alloy for watch makers, due to return after Korean metal crisis

A COBALT BASE alloy originally developed to become the main power spring of the Elgin watch is making a place for itself outside the watch field. Known as Elgiloy, the material was withdrawn from the market during the Korean conflict due to scarcity of alloying elements. With easing of critical metals it will soon be available again.

Alloy combines exceptionally high corrosion resistance with unusual spring properties. Other properties: High hardness, toughness, tensile strength, set and fatigue resistance, and nonmagnetic characteristic. Elgiloy can be stamped, blanked, formed, welded, brazed, and soldered.

Torque — Elgiloy will deliver slightly more torque than carbon steel springs of the same thickness when slightly stressed and as much as 20 per cent more torque where springs are subjected to loadings approaching yield strength of the material. The alloy will exhibit from 85 per cent to well over 1000 per cent higher resistance to fatigue failures, depending on the severity of the repeated stress to which it is subjected.

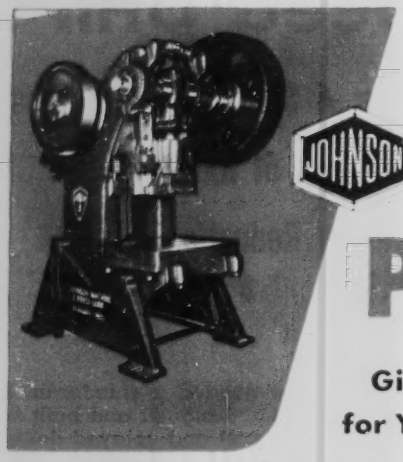


RIGHT MIXTURE OF PROPERTIES
. . . good spring, no corrosion

Good notch resistance or resistance to surface imperfection is a good measure of a metal's toughness. Generally speaking, Elgiloy has no notch sensitivity. Another property: It retains all elastic properties in service to 600 F. The alloy as rolled does not have its full spring potential. Maximum physical properties and increased corrosion resistance are obtained by heat treatment.

Composition—Elgiloy is a cobalt-chromium-nickel alloy having the following composition: Cobalt 40 per cent; chromium 20; nickel 15; molybdenum 7; manganese 2; beryllium 0.04; carbon 0.15; iron balance. In the heat treated condition, yield strength is about 280,000 psi, with an ultimate strength of 370,000 psi.

In addition to spring applications the high mechanical properties have justified use of the alloy in switch springs for certain electrical units. There are other uses where springs are not required to have high fatigue resistance, but corrosion resistance and resistance to setting are important.



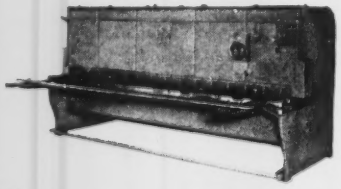
Bonus Built
JOHNSON
POWER PRESSES

Gives You More Service for Your Production Dollar

- Non-Repeating Safety Clutch
- Double Spring Activated
- Unusual Versatility
- Larger Die Space
- Ample Power
- Adaptable to Metals, Plastic, etc.

WRITE FOR SPECIFICATION BULLETIN No. 53

for SPEED POWER ACCURACY
the HYDRA-SHEAR



Will increase your production to a new high. Will shear mild steel up to 10 gauge in three lengths: 6, 8 and 10 feet. Less curl and burring. No gears or clutch.

Johnson MACHINE and PRESS CORP.
620 WEST INDIANA AVENUE • ELKHART, INDIANA

Your Honeywell instrument service starts here . . .

THOROUGH TRAINING is the foundation of Honeywell instrument service. In classrooms and in the Honeywell factories, hand-picked men first are schooled in both the theory and practical art of keeping good instruments in the best condition.

Then they serve an apprenticeship in field work . . . learning still more through first-hand experience. The Honeywell service man who comes to your plant is a full-fledged specialist, well equipped to render the service you need . . . and that your Honeywell instruments deserve.

These men are part of the world's largest instrument service organization. They're at your call in more than 110 Honeywell offices, located near every major production center from coast to coast.

When trouble occurs, just pick up your phone and one of them will get to your plant promptly . . . within a few hours. But to prevent troubles before they start, investigate Periodic Instrument Service . . . an economical plan that assures your instruments of regular check-ups by a capable service man.

Honeywell's service school training is also available, at no charge, to employees of customers.

Your nearest Honeywell office will gladly give you full details about Honeywell instruments, controls . . . and service.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4462 Wayne Ave., Philadelphia 44, Pa.

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls

SHENANGO *Centrifugal* CASTINGS

...YOUR KEY TO SAVINGS
Visit the
SHENANGO BOOTH No. 2622
at the National Metal Exposition
and Congress, October 19-23,
Cleveland, Ohio

FROM TINY LINERS TO HUGE ROLLS
double assurance
OF LONGER LIFE!

FOR close-knit strength and added life, here's a combination you just can't beat—Shenango *centrifugally* cast parts of Meehanite Metal. It is *double* assurance of finer, more uniform, pressure-dense metal, plus freedom from blow holes, sand inclusions and other defects!

So check with Shenango on your need for symmetrical or annular parts—semi-finished if you wish, or machined to your precise specifications in the modern Shenango shops. Get *all* the facts. Like others you'll probably find you can save time, money and trouble.

SHENANGO-PENN MOLD COMPANY
Centrifugal Castings Division
Dover, Ohio
Executive Offices: Pittsburgh, Pa.

SHENANGO
ALL RED BRONZES • MANGANESE BRONZES • ALUMINUM BRONZES
MONEL METAL • NI-RESIST • MEEHANITE® METAL

CALENDAR
OF MEETINGS

October 12-13, American Coke & Coal Chemicals Institute: Annual meeting, The Greenbrier, White Sulphur Springs, W. Va. Institute address: 711-14th St. NW, Washington 5. Executive secretary: Samuel Weiss.

October 12-14, Packaging Institute: Annual meeting, Hotel Statler, New York. Institute address: 342 Madison Ave., New York 17. Executive director: Lawrence V. Burton.

October 12-14, National Association of Sheet Metal Distributors and American Hardware Manufacturers Association: Joint convention, Marlborough-Blenheim hotel, Atlantic City. Information: Thomas A. Fernley Jr., 1900 Arch St., Philadelphia 3.

October 12-14, Engineering Institute on Illumination: University of Wisconsin, Madison, Wis. Information: Prof. H. J. Kubiak, Engineering Institutes, Stadium offices, University of Wisconsin, Madison 6, Wis.

October 12-17, Concrete Reinforcing Steel Institute: Semi-annual meeting, The Greenbrier, White Sulphur Springs, W. Va. Institute address: 38 S. Dearborn St., Chicago 3. Managing director: H. C. Delzell.

October 13, Steel Joist Institute: Semi-annual meeting, The Greenbrier, White Sulphur Springs, W. Va. Institute address: Dupont Circle Bldg., Washington 6. Managing director: C. H. Luedeman.

October 13-15, Caster & Floor Truck Manufacturers Association: Annual meeting, Hotel Cleveland, Cleveland. Association address: 27 E. Monroe, Chicago 3. Executive secretary: Harry P. Dolan.

October 14-16, Scientific Apparatus Makers Association: Midyear meeting, recorder-control section, Seaview Country Club, Absecon, N. J. Association address: 20 N. Wacker Dr., Chicago 6. Executive vice president: Kenneth Andersen.

October 14-16, American Institute of Electrical Engineers: Conference on machine tools, Hotel Cleveland, Cleveland. Institute address: 33 W. 39th St., New York 18.

October 15-17, Foundry Equipment Manufacturers Association: Annual meeting, The Greenbrier, White Sulphur Springs, W. Va. Association address: 1008 Engineers Bldg., Cleveland 14. Assistant treasurer: Arthur J. Tuscany Jr.

October 16, American Supply & Machinery Manufacturers' Association Inc. and National Industrial Distributors' Association: Joint regional meeting and workshop conference, Statler hotel, Washington. Information: R. Kennedy Hanson, 814 Clark Bldg., Pittsburgh 22.

October 16-18, Society of Industrial Designers: Annual design conference, Bedford Springs hotel, Bedford, Pa. Society address: 48 E. 49th St., New York 17. Executive secretary: Sally G. Swing.

October 16-18, Metal Treating Institute: Annual meeting, Hotel Carter, Cleveland. Institute address: 271 North Ave., New Rochelle, N. Y. Executive secretary: C. E. Herington.

October 17-18, American Society for Metals: Annual seminar, Hotel Statler, Cleveland. Society address: 7301 Euclid Ave., Cleveland 3. Secretary: W. H. Eisenman.

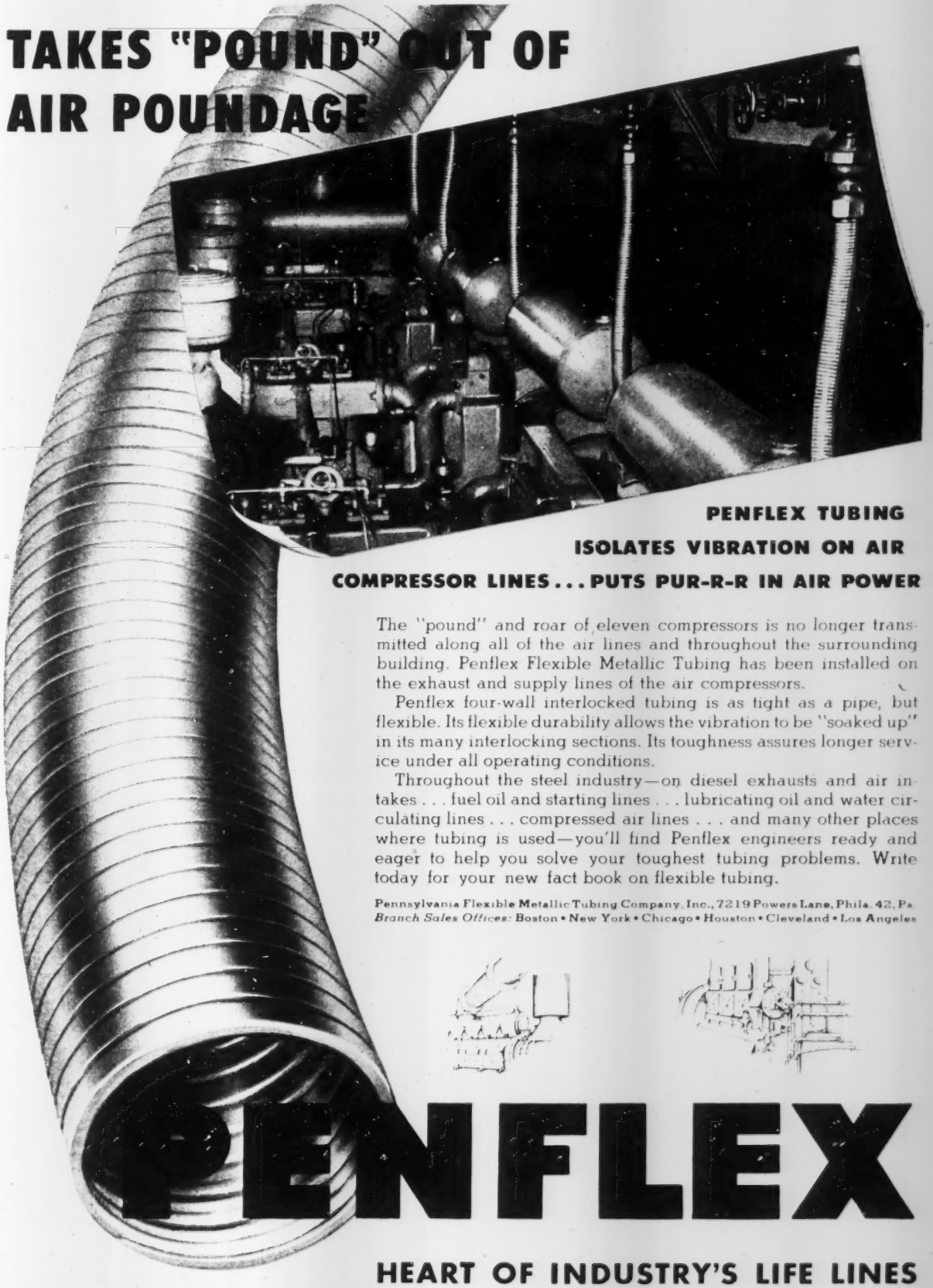
October 17-20, Conveyor Equipment Manufacturers Association: Annual meeting, The Greenbrier, White Sulphur Springs, W. Va. Association address: 1 Thomas Circle, Washington 5.

October 18-22, Chamber of Commerce of the United States: Explaining your business seminar, Broadmoor hotel, Colorado Springs, Colo. Chamber of Commerce address: 1615 H St. NW, Washington.

October 18-22, National Screw Machine Products Association: Fall meeting, Edgewater Gulf hotel, Edgewater Park, Miss. Association address: 2860 E. 130th St., Cleveland 20. Executive secretary: Orrin B. Werntz.

October 18-21, American Standards Association: Annual meeting, Waldorf-Astoria hotel, New York. Association address: 70 E. 45th

TAKES "POUND" OUT OF AIR POUNDAGE



PENFLEX TUBING ISOLATES VIBRATION ON AIR COMPRESSOR LINES... PUTS PUR-R-R IN AIR POWER

The "pound" and roar of eleven compressors is no longer transmitted along all of the air lines and throughout the surrounding building. Penflex Flexible Metallic Tubing has been installed on the exhaust and supply lines of the air compressors.

Penflex four-wall interlocked tubing is as tight as a pipe, but flexible. Its flexible durability allows the vibration to be "soaked up" in its many interlocking sections. Its toughness assures longer service under all operating conditions.

Throughout the steel industry—on diesel exhausts and air intakes . . . fuel oil and starting lines . . . lubricating oil and water circulating lines . . . compressed air lines . . . and many other places where tubing is used—you'll find Penflex engineers ready and eager to help you solve your toughest tubing problems. Write today for your new fact book on flexible tubing.

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PENFLEX

HEART OF INDUSTRY'S LIFE LINES

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NEW SUPER-TOUGH

WILLSON SAFETY HAT

THE NEW WILLSON SAFETY HAT is entirely new in design, material and method of manufacture . . . tough as metal and more resilient! Here are some other outstanding features of the new Willson Super-Tough* Safety Hat . .

streamlined contour—deflects objects more effectively and provides a greater safety "pocket" inside.

new suspension design—adjustable "hammock" headband is suspended *inside* at 6 points. No exposed rivets or lacing—no holes through hat.

comfortably cool—space between headband and shell provides ample air circulation for wearer.

moisture resistant—practically 100% waterproof and resists many caustics and acids.

Passes all required tests with an extra margin of safety!

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WILLSON®

Established 1870

WILLSON PRODUCTS, INC., 233 Washington Street, READING, PA.

St., New York 17. Secretary: Vice Adm. G. F. Hussey Jr., USN (Ret.).

October 19-22, Society of Industrial Packaging & Materials Handling Engineers: Annual national exposition, competition and technical short course. Mechanics Bldg., Boston. Society address: 20 W. Jackson Blvd., Chicago 4. Secretary: J. W. McReynolds.

October 19-23, American Society of Civil Engineers: Annual meeting. Statler hotel, New York. Society address: 33 W. 39th St., New York 18. Executive secretary: Col. William N. Carey.

October 19-23, National Metal Congress & Exposition: Public auditorium, Cleveland. Information: W. H. Eisenman, secretary, American Society for Metals, 7301 Euclid Ave., Cleveland 3.

October 19-23, American Society for Metals: Annual meeting. Hotel Statler, Cleveland. Society address: 7301 Euclid Ave., Cleveland 3. Secretary: W. H. Eisenman.

October 19-23, American Welding Society: Annual meeting. Hotel Cleveland, Cleveland. Society address: 33 W. 39th St., New York 18. Executive secretary: J. G. Magrath.

October 19-23, American Institute of Mining & Metallurgical Engineers: Fall technical session. Hotel Allerton, Cleveland. Institute address: 29 W. 39th St., New York 18. Secretary: Edward H. Robie.

October 19-23, Society for Nondestructive Testing: Annual meeting. Hotel Holleden-Cleveland. Society address: Box 710, Evanston, Ill. Secretary: Philip B. Johnson.

October 19-23, National Safety Council: National safety congress and exposition. Conrad Hilton, Congress, Morrison, Hamilton, La Salle and Palmer House hotels, Chicago. Council address: 425 N. Michigan Ave., Chicago 11. General secretary: R. L. Forney.

October 20, American Society of Safety Engineers: Annual meeting. Conrad Hilton hotel, Chicago. Society address: 425 N. Michigan Ave., Chicago 11. Secretary: J. B. Johnson.

October 21, American Iron & Steel Institute: Birmingham regional technical meeting. Hotel Thomas Jefferson, Birmingham. Institute address: 350 Fifth Ave., New York 1. Secretary: George S. Rose.

October 21-22, Steel Shipping Container Institute Inc.: Fall meeting. Hotels Pierre and Hampshire House, New York. Institute address: 609 Fifth Ave., New York 20. Secretary: L. B. Miller.

October 21-23, Grinding Wheel Institute and Abrasive Grain Association: Combined fall meeting. Statler hotel, Buffalo. Information: Hunter-Thomas Associates, 2130 Keith Bldg., Cleveland.

October 22, National Industrial Conference Board Inc.: Meeting of board members and special conference on guaranteed wages and employment. Hotel Waldorf-Astoria, New York. Board address: 247 Park Ave., New York 17. Secretary: Herbert S. Briggs.

October 22-24, American Ceramic Society: Pacific Coast regional meeting. Palace hotel, San Francisco. Society address: 2525 N. High St., Columbus 2, O. Secretary: Charles S. Pearce.

October 22-25, National Tool & Die Manufacturers Association: Annual meeting. Berkeley-Carteret hotel, Asbury Park, N. J. Association address: 907 Public Square Bldg., Cleveland. Executive secretary: George S. Eaton.

October 23-24, National Noise Abatement Symposium: Armour Research Foundation of Illinois Institute of Technology, Chicago. Program chairman: George L. Bonvallet, Armour Research Foundation of Illinois Institute of Technology, 35 W. 33rd St., Technology Center, Chicago 16.

October 23-28, American Gear Manufacturers Association: Semi-annual meeting. Edgewater Beach hotel, Chicago. Association address: 302 Empire Bldg., Pittsburgh 22. Executive secretary: John C. Sears.

October 26-28, National Lubricating Grease Institute: Annual meeting. Edgewater Beach hotel, Chicago. Institute address: 4638 J. C. Nichols Parkway, Kansas City 12, Mo. Secretary: Harry F. Bennetts.

October 26-29, American Gas Association: Annual convention, Kiel Auditorium, St. Louis. Association address: 420 Lexington Ave., New York 17. Secretary & convention manager: Kurwin R. Boyes.

New development

in rare-earth research

Lan-cer-amp # 10 is the fruition of continuing research in the plant and laboratories of American Metallurgical Products Company. It consists of vacuum-produced rare-earth metals combined with a revolutionary new catalytic agent and sealed in a heavy steel bomb which sinks to the bottom of the ladle before it disintegrates, thus providing better mechanical dispersion in the molten metal. Lan-cer-amp # 10 requires no changes in melting practice. It is the least expensive method, currently in existence, of adding rare-earth to steel. Full production has been attained and orders are being accepted for reasonable delivery.

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Two of the Steelweld Presses in action. These are Model K5-10 machines rated for 12'-0" x 3/8" steel plate. Note how Cleveland Tramrail cranes serve these presses.

Battery of STEELWELD PRESSES and SHEARS Aids Caterpillar Production

Shearing long ½-inch thick strips into small rectangles on a Series 8D-10 Steelweld. The long extension squaring arm at front facilitates this work.

THOUSANDS of tons of steel of different thicknesses are sheared and formed on Steelweld Shears and Presses into various shapes required for the large volume of tractor equipment produced at the new Joliet, Illinois, plant of Caterpillar Tractor Co. These items include scrapers, rippers, bulldozer blades and wagons.

The heavy construction of Steelweld machines and many high quality features with which they are provided make possible continuous trouble-free performance. Their design includes a number of innovations which ease operation, speed production and enable accuracy to close tolerances.

The fact that Caterpillar has bought Steelweld Shears and Presses repeatedly and now has a large battery of them is mute testimony to the satisfaction they are giving.

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Catalogs No. 1010 (Presses) and No. 1011 (Shears) give construction and engineering details. Profusely illustrated.

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STEELWELD

PRESSES and SHEARS

STEEL
October 12, 1953

Market Outlook

THE COST of steel to the consumer is on the way down. How far it will go will be determined by how much steel producers have to strive for business.

Biggest new step to lower the cost of steel to consumers is the steel companies' broad move to absorb some of the freight charges for delivering steel to buyers. Premium base price reductions, which started before the return to freight absorption, are still going on. They were sufficient last week to lower STEEL's arithmetical price composite on finished steel from $115.56 a net ton to $115.54

LAST RESORT—Other ways to lower cost of steel to consumers are for steel producers to reduce standard base prices and cut or waive extras. However, these means will not be resorted to unless steel producers have to do something besides absorb freight charges to compete.

Steel producers will feel their way along in freight absorption. They'll try to determine where they have to absorb, how much and on what products. Absorption will be on a selective basis, the degree of selectivity depending on how much the producers desire a piece of business. At any rate, absorption will not be on a blanket basis. A producer, for instance, may some day absorb freight at one point on narrow cold-rolled carbon steel sheets but not on wide sheets, for maybe there is no competition in wide sheets at that consuming point.

FIRST TO BE AFFECTED— Freight absorption will come first in greatest degree on products that are in freest supply. They include wire, tin plate, some forms of tubing, some of the alloys, various specialties and pig iron.

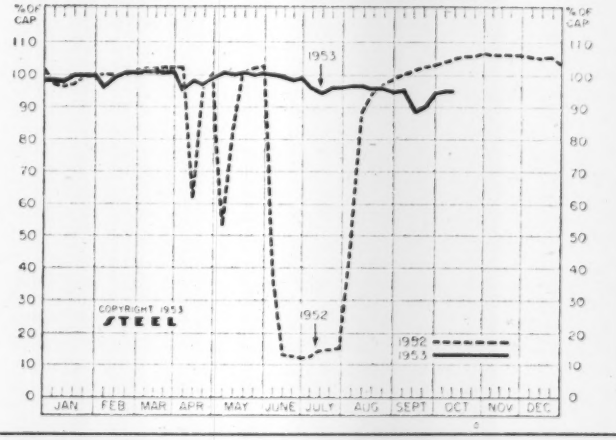
Return of competition to the steel market is prompting some producers to open their order books for the entire first quarter of 1954 instead of a month at a time.

VARIATIONS—The return of competition is not being felt to the same degree in all forms of steel or in all geographical areas, however. For instance, in the Chicago area, where steel consumption exceeds steel producing capacity, one producer of cold-rolled carbon steel sheets thinks it probably will have to continue customer quotas on that product in the first quarter.

FREEING STAINLESS—The loosening in demand and improvement in supply of metals brought announcement of the approaching relaxation of the last major government control on metals. Control of nickel will ease on Nov. 1. After that date, nickel-bearing stainless steels can be distributed freely. The switch from straight chrome types of stainless may be so universal and lump so heavily that voluntary quotas may have to be imposed for a while on the nickel-bearing types. For some time, consumers and distributors have been preparing for the change. They have been lowering their inventories of the straight chrome types of stainless. In addition, distributors have been building their stocks of the nickel-bearing types. During controls, sales of the nickel-bearing types were restricted to defense uses.

SCRAP DECLINE HALTS— The two-month descent of prices of scrap, a principal raw material for steelmaking, halted last week. In fact, a slightly strengthened undertone in the market raised STEEL's composite price from the preceding week's $31.50 to $31.83.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of capacity engaged at leading production points)

	Week Ended Oct. 10	Change	Same 1952	Week 1951
Pittsburgh	96.5	— 3.5*	106	100
Chicago	95.5	— 3*	106.5	98
Mid-Atlantic	97	0	98	99
Youngstown	105	0	106	94
Wheeling	97	— 0.5	96.5	101
Cleveland	102	+ 5.5*	107	98.5
Buffalo	106.5	0	106.5	104
Birmingham	96.5	0	102	104
New England	80	— 2	95	95
Cincinnati	84	— 1	90	101
St. Louis	103	+ 7	105	93
Detroit	106	— 1.5	111	101.5
Western	102	— 1	109	103
Estimated National Rate	95	0	104.5	101.5

*Change from preceding week's revised rate.

Weekly steelmaking capacity is estimated at 2,254,459 net tons in 1953; 2,077,040 tons in 1952; 1,999,034 tons in 1951.

PRICE INDEXES AND COMPOSITES

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics) Week Ended Oct. 6

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them write to STEEL.

Rails, standard, No. 1	$4.460	Bars, H.R., alloy	$8.675	Strip, C.R., stainless, 430 (lb)	$0.415	Tin plate, hot-dipped, 1.25 lb	$8.433
Rails, light, 49 lb	5.767	Bars, H. R., stainless, 303 (lb)	0.418	Strip, H.R., carbon	5.113	Tin plate, electrolytic, 0.25 lb	7.133
Tie Plates	5.125	Bars, H.R., carbon	4.850	Pipe, black, buttweld (100 ft)	14.454	Black plate, can making quality	6.233
Axles, railway	7.250	Bars, reinforcing	4.775	Pipe, galv., buttweld (100 ft)	17.731	Wire, drawn, carbon	7.713
Wheels, freight car, 33 in. (per wheel)	47.000	Bars, C.F., carbon	7.850	Pipe, line (100 ft)	141.960	Wire, drawn, stainless, 430 (lb)	0.545
Plates, carbon	4.550	Bars, C.F., alloy	11.075	Casing, oil well, carbon (100 ft)	149.516	Bale ties (bundle)	5.653
Structural Shapes	4.383	Bars, C.F., stainless, 302 (lb)	0.433	Casing, oil well, alloy (100 ft)	214.113	Nails, wire, 8d common	7.488
Bars, tool steel, carbon (lb)	0.415	Sheets, H.R., carbon	4.765	Tubes, boiler (100 ft)	‡	Wire, barbed (80-rod spool)	6.847
Bars, tool steel, alloy, oil hardening die (lb)	0.505	Sheets, C.R., carbon	5.904	Tubing, mechanical, carbon (100 ft)	‡	Woven wire fence (20-rod roll)	16.174
Bars, tool steel, H.R. alloy, high speed W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.135	Sheets, galvanized	6.945	Tubing, mechanical, stainless, 304 (100 ft)	161.193	‡Not available.	
Bars, tool steel, H.R. alloy, high speed W 18, Cr 4, V 1 (lb)	1.730	Sheets, C.R., stainless, 302 (lb)	0.548				
		Sheets, electrical	9.183				
		Strip, C.R., carbon	7.371				

FINISHED STEEL PRICE INDEX (Bureau of Labor Statistics)

	Oct. 6 1953	Sept. 29 1953	Month Ago	Sept. Average
(1947-1949=100)	141.7	141.7	141.7	141.7

STEEL's FINISHED PRICE INDEX

	Oct. 8 1953	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Index (1935-39 av.=100)	189.38	189.38	189.38	181.31	143.08
Index in cents per lb.	5.130	5.130	5.130	4.912	3.876

STEEL's ARITHMETICAL PRICE COMPOSITE*

	Oct. 8 1953	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Finished Steel, NT	$115.54	$115.56	$115.56	$110.98	$95.05
No. 2 Fdry. Pig Iron, GT.	56.54	56.54	56.54	55.04	44.30
Basic Pig Iron, GT	56.04	56.04	56.04	54.66	43.86
Malleable Pig Iron, GT.	57.27	57.27	57.27	55.77	44.68
Steelmaking Scrap, GT.	31.83	31.50	38.67	43.00	43.33

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

COMPARISON OF PRICES

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Oct. 8 1953	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	4.15	4.15	4.15	3.95	3.45
Bars, H.R., Chicago	4.15	4.15	4.15	3.95	3.35
Bars, H.R., del. Philadelphia	5.302	5.302	5.502	4.502	3.79
Bars, C.F., Pittsburgh	5.20	5.20	5.20	4.925	3.95
Shapes, Std., Pittsburgh	4.10	4.10	4.10	3.85	3.25
Shapes, Std., Chicago	4.10	4.10	4.10	3.85	3.25
Shapes, deld., Philadelphia	4.38	4.38	4.38	4.13	3.48
Plates, Pittsburgh	4.10	4.10	4.10	3.90	3.50
Plates, Chicago	4.10	4.10	4.10	3.90	3.40
Plates, Coatesville, Pa.	4.35	4.35	4.35	4.35	3.75
Plates, Sparrows Point, Md.	4.10	4.10	4.10	3.90	3.45
Plates, Claymont, Del.	4.55	4.55	4.55	4.35	3.95
Sheets, H.R., Pittsburgh	3.925	3.925	3.925	3.775	3.275
Sheets, H.R., Chicago	3.925	3.925	3.925	3.775	3.25
Sheets, C.R., Pittsburgh	4.775	4.775	4.775	4.575	4.00
Sheets, C.R., Chicago	4.775	4.775	4.775	4.575	4.00
Sheets, C.R., Detroit	4.975	4.975	4.975	4.775	4.20
Sheets, Galv., Pittsburgh	5.275	5.275	5.275	5.075	4.40
Strip, H.R., Pitts.	3.975-4.425	3.975-4.425	3.975-4.425	3.75-4.225	3.275
Strip, H.R., Chicago	3.925	3.925	3.925	3.725	3.275
Strip, C.R., Pittsburgh	5.45-5.95	5.45-5.95	5.45-5.95	5.10-5.80	4.00
Strip, C.R., Chicago	5.70	5.70	5.70	5.35	4.125
Strip, C.R., Detroit	5.45-6.05	5.45-6.05	5.45-6.05	5.30-6.05	4.20
Wire, Basic, Pitts.	5.475-5.525	5.475-5.525	5.475-5.525	5.10-5.225	4.15
Nails, Wire, Pittsburgh	6.35-6.55	6.35-6.55	6.35-6.55	6.20-6.35	5.15
Tin plate (1.50 lb), box, Pitts	$8.95	$8.95	$8.95	$8.95	$6.70

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$75.50	$75.50	$75.50	$70.50	$61.00
Wire rods, $\frac{5}{32}$-$\frac{9}{16}$", Pitts.	4.525	4.525	4.525	4.325	3.45

PIG IRON, Gross Ton	Oct. 8 1953	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bessemer, Pitts.	$57.00	$57.00	$57.00	$55.50	$47.00
Basic, Valley	56.00	56.00	56.00	54.50	43.00
Basic, deld., Phila.	60.75	60.75	60.75	59.25	46.17
No. 2 Fdry, Pitts.	56.50	56.50	56.50	55.00	44.50
No. 2 Fdry, Chicago	56.50	56.50	56.50	55.00	43.25
No. 2 Fdry, Valley	56.50	56.50	56.50	55.00	43.50
No. 2 Fdry, deld, Phila.	61.25	61.25	61.25	59.75	46.67
No. 2 Fdry, Birm.	52.88	52.88	52.88	51.38	43.38
No. 2 Fdry (Birm.) del. Cin.	60.43	60.43	60.43	58.93	49.00
Malleable, Valley	56.50	56.50	56.50	55.00	43.50
Malleable, Chicago	56.50	56.50	56.50	55.00	43.50
Ferromanganese, Duquesne	200.00†	200.00†	200.00†	228.00*	148.00*

*78-82% Mn, per gross ton, Etna, Pa. †74-76% Mn, per net ton.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pitts.	$34.50	$34.50	$41.50	$44.00	$42.75
No. 1 Heavy Melt, E. Pa.	31.50	30.50	39.00	41.50	45.50
No. 1 Heavy Melt, Chicago	29.50	29.50	35.50	42.50	41.75
No. 1 Heavy Melt, Valley	33.50	34.50	39.50	44.00	42.75
No. 1 Heavy Melt, Cleve.	30.50	30.50	35.50	43.00	42.25
No. 1 Heavy Melt, Buffalo	33.50	35.50	41.50	43.00	40.25
Rails, Rerolling, Chicago	42.50	49.00	52.00	52.50	63.25
No. 1 Cast, Chicago	32.50	32.50	35.00	48.50	70.00

COKE, Net Ton					
Beehive, Furn, Connisvl.	$14.75	$14.75	$14.75	$14.75	$14.25
Beehive, Fdry, Connisvl.	16.75	16.75	16.75	17.00	17.00
Oven Fdry, Chicago	24.50	24.50	24.50	23.00	20.40

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

PRIMARY METALS AND ALLOYS

Aluminum: 99% plus, ingots 21.50, pigs 20.00, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 12% Si, 23.30; No. 43, 5% Si, 23.10; No. 142, 4.8 Cu, 24.40; No. 195, 4.5% Cu, 0.8% Si, 23.70; No. 214, 3.8% Mg, 24.40; No. 356, 7% Si, 0.3% Mg, 23.20.

Antimony: R.M.M. brand, 99.5% 34.50, Lone Star brand, 35.00, f.o.b. Laredo, Texas, in bulk. Foreign brands, 99.5%, 25.50-26.00 New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $72.75 per lb of contained Be, f.o.b. Reading, Pa.

Beryllium Copper: 3.75-4.25% Be, $40.00 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. Reading, Pa., or Elmore, O.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $2.00 per lb, deld.

Cobalt: 97-99%, $2.40 per lb for 550 lb keg; $2.42 per lb for 100 lb case; $2.47 per lb under 100 lb.

Columbium: Powder, $75.00 per lb, nom.

Copper: Electrolytic, 29.00-30.00, deld. Conn. Valley; 29.125-30.125, deld. Midwest; Lake 30.125 deld; Fire refined 29.75 deld.

Germanium: 99.9%, $295 per lb, nom.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $165-$175 per troy oz.

Lead: Common 13.30, chemical 13.40, corroding 13.40, St. Louis, New York basis, add 0.20.

Lithium: 98%, $10-$13 per lb, depending on quantity.

Magnesium: 99.8% standard ingots 27.00, 10,000 lb or more, f.o.b. Freeport, Tex. Sticks, 1.3 in. dia., 45.00, 100 to 4999 lb.

Magnesium Alloys: AZ91B 30.50; AZ91C and alloys C, H, G and R 32.50; alloy M 31.50, 10,000 lb or more.

DAILY NONFERROUS PRICE RECORD

	Price Oct. 8	Last Change	Previous Price	Sept. Avg.	Aug. Avg.	Oct. 1952 Avg.
Copper	29.00-30.00	Aug. 19	28.50-30.00	29.500	29.375	24.500
Lead	13.30	Sept. 16	13.80	13.540	13.800	14.226
Zinc	10.00	Sept. 11	10.50	10.180	11.000	13.259
Tin	81.75	Oct. 7	82.75	82.410	80.530	121.500
Nickel	60.00	Jan. 14	56.50	60.000	60.000	56.500
Aluminum	21.50	July 15	20.50	21.500	21.500	20.000
Magnesium	27.00	Mar. 9	24.50	27.000	27.000	24.500

Quotations in cents per pound based on: Copper, deld. Conn. Valley; Lead, common grade, deld. St. Louis; Zinc, prime western, E. St. Louis; Tin, Straits, deld. New York; Nickel, electrolytic cathodes, 99.9%, base size at refinery unpacked; Aluminum, primary ingots, 99% plus, deld.; Magnesium, 99.8%, Freeport, Tex.

Mercury: Open market, spot, New York, $152-$154 per 76-lb flask.

Molybdenum: Powder, 99% hydrogen reduced $3.40 per lb; pressed ingot $4.06 per lb; sintered ingot $5.53 per lb.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 60.00; 25-lb pigs 62.65; "XX" nickel shot 62.65; "F" nickel shot or ingots, for addition to cast iron 60.00; prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 0.92.

Osmium: $110-$120 per troy oz. nom.

Palladium: $23-$24 per troy oz.

Platinum: $91-$93 per troy oz. from refineries.

Radium: $16.00-$21.00 per mg. radium content, depending on quantity.

Rhodium: $125 per troy oz.

Ruthenium: $80-$85 per troy oz.

Selenium: 99.5%, $1.25-$1.75 per lb.

Sodium: 16.50, carlots; 17.00 l.c.l.

Tantalum: Sheet, rod $42.45 per lb; powder $33.50 per lb.

Tellurium: $1.75 per lb.

Thallium: $12.50 per lb.

Tin: Straits, New York, 81.75.

Tungsten: Powder, 98-99%, carbon reduced, 1000 lb lots $5.35 per lb f.o.b. shipping point; less than 1000 lb $5.50; 99+% hydrogen reduced, 50 lb. Treated ingots $10.43.

Zinc: Price western 10.00, brass special 10.25, intermediate 10.50, E. St. Louis, freight allowed over 0.50 per pound. High grade 11.35, special high grade 11.50, die casting alloy ingot 14.50, deld.

Zirconium: Sponge $14.00 per lb; powder 100 lb or more $7.00; less than 100 lb $8.00.

(Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston Alloys 21.00-21.50; No. 12 foundry alloy (No. 2 grade) 20.50-21.50; 5% silicon alloy, 0.60 Cu max. 22.75-23.25; 13 alloy, 0.60 Cu max. 22.75-23.25; 195 alloy 21.50-22.50; 108 alloy 21.00-21.50; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 21.00-22.50; grade 2, 19.50-21.00; grade 3, 18.50-20.00; grade 4, 18.00-19.00.

Brass Ingot: Red brass, No. 115, 24.50; tin bronze, No. 225, 33.25, No. 245, 29.50; high-leaded tin bronze, No. 305, 28.75; No. 1 yellow, No. 405, 20.75; manganese bronze No. 421, 25.25.

Magnesium Alloy Ingot: AZ63A, 31.50; AZ91B, 31.50; AZ91C, 32.00; AZ92A, 31.50.

NONFERROUS MILL PRODUCTS

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 100,000 lb lots, 35.36; 30,000 lb lots, 35.48; l.c.l. 36.36. Weatherproof, 100,000 lb, 36.28; 30,000 lb, 36.53; l.c.l., 37.03. Magnet wire deld., 15,000 lb or more 41.83; l.c.l., 42.58.

LEAD

(Prices to jobbers f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more $18.50 per cwt; pipe, full coils $18.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb 100,000 lb and over, f.o.b. mills.) Sheets, $15; sheared mill plate, $12; strip, $15; wire, $16; forging billets, $6; hot-rolled and forged bars, $6.

ZINC

Sheets 23.00, f.o.b. mill, 36,000 lb and over. Ribbon, zinc in coils, 19.50-20.50, f.o.b. mill, 36,000 lb and over. Plates 19.50-22.25.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheet, C.R.	86.5	67.5	92.5
Strip, C.R.	92.5	70.5	98.5
Plate, H.R.	81.5	66.5	90.5
Rod, Shapes	82.5	66.5	88.5
Seamless Tubes	115.5	100.5	137.5
Shot, Blocks	60.0		

ALUMINUM

(30,000 lb base; freight allowed on 500 lb or more.)

Sheets and Circles: 2S and 3S mill finish c.l.

Thickness Range Inches	Widths or Diameters, Sheet In., Inc.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	33.9	...	...
0.135-0.096	12-48	34.4	...	...
0.095-0.077	12-48	35.1	32.7	37.5
0.076-0.061	12-48	35.7	32.9	37.7
0.060-0.048	12-48	36.1	33.2	38.1
0.047-0.038	12-48	36.6	33.6	38.4
0.037-0.030	12-48	37.0	34.0	39.1
0.029-0.024	12-48	37.6	34.3	39.6
0.023-0.019	12-36	38.3	35.1	40.4
0.018-0.017	12-36	39.1	35.7	41.3
0.016-0.015	12-36	40.0	36.5	42.5
0.014	12-24	41.0	37.5	43.8
0.013-0.012	12-24	42.1	38.2	44.8
0.011	12-24	43.1	39.4	46.4
0.010-0.0095	12-24	44.3	40.5	48.0
0.009-0.0085	12-24	45.6	41.9	50.0
0.008-0.0075	12-24	47.1	43.1	51.8
0.007	12-18	48.6	44.6	54.1
0.006	12-18	50.2	46.0	59.1

* Lengths 72 to 180 inches. † Maximum diameter, 26 inches.

ALUMINUM

Plates and Circles: Thickness 0.250-3.0 in.; widths or diameters 24-60 in., lengths 72-240 in.

Alloy	Plate Base	Circle Base
2S-F, 3S-F	32.4	36.3
50S-F	33.5	37.4
4S-F	34.5	39.1
52S-F	36.2	40.9
61S-T6	37.4	41.5
24S-T4*	39.3	45.4
75S-T6*	47.1	53.7

* Widths or diameters 24-48 in., lengths 72-180 in.

ALUMINUM

Screw Machine Stock: 5000 lb and over.

Dia. (in.) or distance across flats	Round 11S-T3	Round 17S-T4	Hexagonal 11S-T3	Hexagonal 17S-T4
Drawn				
0.125	59.6	57.9	...	...
0.156-0.172	50.6	48.9	...	...
0.188	50.6	48.9	...	62.4
0.219-0.234	47.9	46.2	...	...
0.250-0.281	47.9	46.2	...	59.5
0.313	47.9	46.2	...	56.8
Cold-finished				
0.375-0.531	46.6	44.9	56.2	53.4
0.563-0.688	46.6	44.9	53.4	50.2
0.750-1.000	45.5	43.8	48.9	47.3
1.063	45.5	43.8	...	45.7
1.125-1.500	43.8	42.1	47.3	45.7
Rolled				
1.563	42.7	41.0	...	...
1.625-2.000	42.1	40.4	...	44.1
2.125-2.500	41.1	39.4	...	...
2.750-3.375	39.9	38.2	...	...

ALUMINUM

Forging Stock: Round, Class 1, 42.05-32.76, in specific lengths 36-144 in., diameters 0.375-5 in.; rectangles and squares, Class 1, 49.2 to 37.6 in random lengths 0.375-4.0 in. thick, widths 0.750-10.0 in.

Industrial Roofing Sheet (0.032-in. thick): Flat, 42.75 in. wide, lengths 60-144 in., $2.828 to $6.816 per sheet. Corrugated, 35 in. wide, lengths 60-144 in., $2.862 to $6.874 per sheet.

MAGNESIUM

Sheet: AZ31, commercial grade, 0.032-in. 108.00; 0.064-in. 81.00; 0.125-in. 71.00; 30,000 lb and over, f.o.b. mill.

Plate: Hot-rolled, AZ31, 53.00, 20,000 lb or more; 0.188-1.0 in. thick, widths to 48 in., lengths to 144 in.; raised pattern floor plate, 59.00, 20,000 lb or more, ¼-in. thick, widths 24-48 in., lengths 60-144 in.

Extrusion Stock: AZ31, Rectangles, ¾ x 2 in. 65.20, 1 x 4 in. 63.00. Rod, 1 in. 66.00, 2 in. 62.50. Tubing, 1 in. OD x 0.065-in. 87.00. Angles, 1 x 1 x ⅛-in. 72.00, 2 x 2 x ¼-in. 67.00. Channels, 5 in. 67.80. I-Beams, 5 in. 66.20.

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tube	Clean Heavy	Rod Ends	Clean Turnings
Copper	48.38b	45.98c	....	48.44	26.000	26.000	25.250
Yellow brass	41.72	41.66	42.26	44.63	19.750	19.500	18.000
Red Brass, 85%	45.41	45.38	45.98	48.25	23.000	22.750	22.250
Low Brass, 80%	44.47	44.41	45.01	47.28	22.125	21.875	21.375
Naval Brass	45.76	40.07	52.80	48.92	18.250	18.000	17.500
Commercial Bronze, 90%	46.95	46.89	47.49	49.51	23.875	23.625	23.125
Nickel Silver, 10%	55.36	55.43g	57.69	....	23.625	23.375	11.813
Phosphor Bronze, A, 5%	68.58	67.08	67.08	68.23	26.125	25.875	24.875
Silicon Bronze	52.71	51.90	52.75	70.11e	25.125	24.875	24.125
Manganese Bronze	49.48	43.62	54.06	....	18.250	18.000	17.500
Muntz Metal	43.96	39.77	....	....	18.625	18.375	17.875

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 pounds, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. g. Leaded.

NONFERROUS SCRAP

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Aluminum: 2S clipping 12.00; low copper clippings 9.00; mixed clippings 9.00; old sheet 8.00-8.50; borings and turnings 5.50-6.00; pistons and struts 6.00; crankcases 8.00; industrial castings 8.00-8.50.

Copper and Brass: Heavy copper and wire, No. 1 22.00; No. 2 copper 20.50; light copper 17.50-18.00; No. 1 composition red brass 16.00-16.50; No. 1 composition turnings 15.50-16.00; mixed brass turnings 9.50; new brass clippings 17.50; No. 1 brass rod turnings 12.00; light brass 9.50-10.00; heavy yellow brass 11.50; new brass rod ends 14.00-14.50; auto radiators, unsweated 12.00; cocks and faucets 13.00; brass pipe 14.50.

Lead: Heavy 9.50-10.00; battery plate 5.25-5.75; linotype and stereotype 11.75; electrotype 10.50; mixed babbitt 12.00.

Magnesium: Clippings 20.00-21.00; clean castings 19.00-20.00; iron castings, not over 10% removable Fe, 18.00-19.00.

Monel: Clippings 26.00-28.00; old sheet 24.00-26.00; turnings 19.00-21.00; rods 26.00-28.00.

Nickel: Sheets and clips 70.00; rolled anodes 70.00; turnings 40.00; rod ends 70.00.

Tin: No. 1 pewter 40.00-45.00; block tin pipe 65.00-67.00; No. 1 babbitt 37.00-38.00.

Zinc: Old zinc, 3.50; new die cast scrap, 3.50; old die cast scrap, 3.25.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 2S, 3S clippings 14.00-14.50; 5S, 52S clippings 14.00-14.50; 14S, 17S, 24S, clippings 12.50-14.00; mixed clippings 12.50-13.00; old sheet 10.00-11.00; old cast 10.00-11.00; clean old cable, free of steel 13.50-14.50; borings and turnings 11.00-12.00.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 42.00; light scrap 37.00.

Copper, Brass: No. 1 copper 23.50-24.00; No. 2 copper 22.00-22.50; light copper 20.50-21.00; refinery brass (60% copper) per dry copper content 19.00; auto radiators 13.00 nom.

INGOT MAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper, Brass: No. 1 copper 23.50-24.50, No. 2 copper 22.00-22.50; light copper 20.50-21.00; No. 1 composition borings 16.50-17.00; No. 1 composition solids 17.00-17.50; heavy yellow brass solids 13.00-13.50; yellow brass turnings 12.50-12.75; radiators 13.00-13.50.

PLATING MATERIALS

(F.o.b. shipping points, freight allowed on quantities.)

ANODES

Cadmium: Special or patented shapes $2.15 per lb.

Copper: Flat-rolled 45.01, oval 44.54, 2000-5000 lb, electrodeposited 39.75, cast 42.04, 5000-10,000 lb lots.

Nickel: Depolarized, less than 500 lb 92.00; 500-1999 lb 88.00; over 5000 lb 86.00.

Tin: Bar or slab, less than 200 lb $1.015; 200-499 lb $1; 500-999 lb 99.50; 1000 lb or more 99.

Zinc: Bar 18.50, bar or flat top 17.50, ton lots.

CHEMICALS

Cadmium Oxide: $2.15 per lb in 100 lb drums.

Chromic Acid: Less than 2000 lb 29.00; over 2000 lb 28.75.

Copper Cyanide: Under 1000 lb 63.00, 1000 lb and over 61.50.

Copper Sulphate: 100-6000 lb 11.35; 6000-12,000 lb 11.10; 12,000-24,000 lb 10.85; 24,000-36,000 lb 10.60; 36,000 lb and over 10.35.

Nickel Chloride: 100 lb 45.00; 200 lb 43.00; 300 lb 42.00; 400-4900 lb 40.00; 5000-9900 lb 38.00; 10,000 lb and over 37.00.

Nickel Sulphate: 100 lb 37.00; 200 lb 35.00; 300 lb 34.00; 400-4900 lb 32.000; 5000-35,900 lb 30.00; 36,000 lb and over 29.00.

Silver Cyanide: Cents per ounce, 16 oz 80.625; 100 oz 78.500; 2500 oz and over 77.375.

Sodium Cyanide: Egg, under 1000 lb 19.80; 1000-19,900 lb 18.80; 20,000 lb and over 17.80; granular, add 1¢ premium to above.

Sodium Stannate: Less than 100 lb 66.20; 100-600 lb 62.40; 700-1900 lb 58.80; 2000-5000 lb 48.10; 10,000 lb or more 47.

Stannous Chloride (Anhydrous): Less than 50 lb $1.500; 50 lb $1.165; 100-200 lb $1.025; 300-500 lb 96.40; 1000-19,000 lb 87; 20,000-49,000 lb 83.50; 50,000-99,000 lb 87.20; 100,000 lb and over 81.10.

Stannous Sulphate: Less than 50 lb $1.211; 50 lb 91.10; 100-150 lb 89.30; 200 lb and over 87.10.

Zinc Cyanide: Under 1000 lb 54.30, 1000 lb and over 52.30.

Nonferrous Metals

Nickel sheds its controls Nov. 1. But don't expect a perfect market immediately. Transition to normal business pattern may take 3 months; defense still comes first

NOV. 1 WILL MARK "independence day" for nickel users.

That's when long-standing controls on civilian distribution and use become history. Manufacturers may then buy as much nickel as they can and do with it as they like.

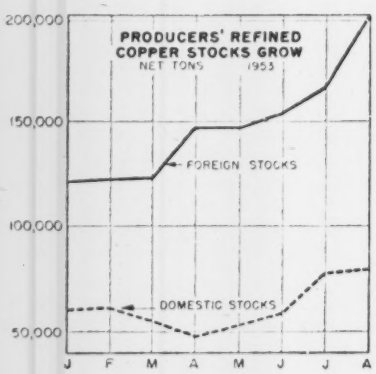
Qualifications—The revocation action doesn't mean everyone will get all the nickel he wants right away. Defense needs (AEC, stockpile and military goods) will get first call on the available metal. Military and atomic energy uses alone take an estimated 40 per cent of supply.

Stockpile accumulations will continue on a regular basis, says Defense Mobilizer Arthur Flemming, even if it pinches civilian supplies. Reduction in defense needs plus increased production coming make this unlikely. Long-term purchase contracts largely account for stockpiling requirements.

Timetable — After nickel distribution is returned to private industry, a transition period of about three months is expected before a normal business pattern takes shape. Removal of restrictions in other metals found balance not long in coming and the same could be true with nickel. One observer says sellers may not find as much business backed up as they think.

The U. S., world's largest consumer of nickel, last year used 101,047 tons of primary and secondary nickel, oxide, matte and salts. That compares with 86,416 tons in 1951, 98,904 tons in 1950 and 68,326 tons in 1949. Distribution by uses in 1952 looks about like this: Stainless and other steels, 45 per cent; copper-nickel, nickel-silver and other alloys, and Monel, Inconel and malleable nickel, 31 per cent; high temperature and electrical resistance alloys, 8 per cent; electroplating, 7 per cent; cast iron and other uses, 3.5 per cent each. With decontrol, some sharp changes in this distribution pattern should take shape (see page 89).

Scrap Flow—Major nickel sellers in the U. S. are International Nickel Co., Falconbridge Nickel Mines Ltd. and Nickel Sales Division of National Lead Co. (Nicaro Nickel Oxides). Some Japanese and French metal has been sold here lately at several times the U. S. price, but these are considered one-shot propositions. Scrap movement, said to be immobilized by controls, will show more velocity, and prices are likely to drop. Scrap demand was high because it wasn't subject to the rigid restrictions of primary nickel. Inquiries as to the possibility of a price rise in primary nickel are met with a firm "no comment."



Source: Copper Institute

A portion of M-80's skeleton still remains—Schedule 5, which covers columbium and tantalum, last of all elements under use curbs. As it looks a bit silly dangling alone and for no good reason, it will be revoked as fast as administrative procedure allows.

Zinc: Imports Add to Problem

Stocks of slab zinc going into October stood at the highest level since August, 1947. Increase of 23,597 tons during September sent the stock level up sharply to 141,494 tons. Shipments fell off about 12 per cent to 57,547 and unfilled orders dropped over 5000 tons to 27,323 tons while production eased only slightly to 81,144 tons, according to American Zinc Institute statistics.

Slash in slab zinc production to the lowest rate since 1938 at its La Salle, Ill., smelter was announced by Matthiessen & Hegeler Zinc Co. H. D. Carus, president, says the action "is necessitated by the unstemmed flow of cheap foreign zinc into the United States." During the first seven months of 1953, he says, imports of slab zinc amounted to 288,328 tons, an increase of 242 per cent over the like period last year.

Aluminum Allotments Rise

Independent aluminum fabricators will get more than 50,500 tons of primary aluminum in the fourth quarter under government contracts with major producers, about 40 per cent more than is required. General Services Administration estimates fourth-quarter primary production at 325,500 tons, of which 115,500 tons will come from new facilities. Government expansion contracts require that two-thirds of all aluminum produced in new facilities be made available to independent fabricators after defense and AEC requirements are met. In the third quarter independents got 45,000 tons of aluminum; about 110,000 tons of the 325,000 tons total production in that period came from new reduction works.

Chilean Copper Takes a Step

Revaluation of the Chilean peso, approved by the International Monetary Fund last week, stands as the first step toward getting Chile's copper back on world markets. Negotiations in Washington over purchase of that nation's copper for stockpile are part of a plan to work out a sensible long-term solution to Chile's unstable economic position. The Chilean government's proposal, undoubtedly encouraged by the U. S., is to devalue the peso from the current rate of 31 to the U. S. dollar to 110, which is about the present market rate of exchange. U. S. copper producers in Chile were held to an exchange rate of 19.37 pesos to the dollar and would presumably be able to buy at 110 under the proposal.

Nonferrous Briefs

- National Lead & Zinc Committee withdrew its recommendation to the U. S. Tariff Commission that import quotas be set up on lead and zinc, saying that such a system would prove complicated and almost impossible to administer fairly.
- Average lead imports in 1953 are running only slightly ahead of the 1952 average. Total lead stocks on Sept. 1 gained 11,305 tons in a month's time, and at 183,032 tons were highest since September, 1950.
- Tin price and demand eased last week as threat of Atlantic Coast dock strike faded.

SLAB ZINC

every grade of ZINC
for urgent military and
civilian requirements

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HIGH GRADE

SPECIAL HIGH GRADE

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AMERICAN ZINC, LEAD & SMELTING COMPANY

Columbus, O Chicago St. Louis New York

STEEL PRICES

Mill prices as reported to STEEL, cents per pound except as otherwise noted. Changes shown in italics.
Code numbers following mill points indicate producing company; key on page 357. Key to footnotes, page 359.

—SEMIFINISHED—

INGOTS, Carbon, Forging (NT)

Fontana,Calif. K1 ....$86.00
Munhall,Pa. U5 ....59.00

INGOTS, Alloy (NT)

Detroit R7 ....$63.00
Fontana,Calif. K1 ....86.00
Midland,Pa. C18 ....62.00
Munhall,Pa. U5 ....62.00

BILLETS, BLOOMS & SLABS
Carbon Rerolling (NT)

Aliquippa,Pa. J5 ....$62.50
Bessemer,Pa. U5 ....62.00
Clairton,Pa. U5 ....62.00
Ensley,Ala. T2 ....62.00
Fairfield,Ala. T2 ....62.00
Fontana,Calif. K1 ....81.00
Gary,Ind. U5 ....62.00
Johnstown,Pa. B2 ....62.00
Lackawanna,N.Y. B2 ....62.00
Munhall,Pa. U5 ....62.00
So.Chicago,Ill. U5 ....62.00
So.Duquesne,Pa. U5 ....62.00

Carbon, Forging (NT)

Aliquippa,Pa. J5 ....$75.50
Bessemer,Pa. U5 ....75.50
Buffalo R2 ....75.50
Canton,O. R2 ....75.50
Clairton,Pa. U5 ....75.50
Cleveland R2 ....75.50
Conshohocken,Pa. A3 ....82.50
Detroit R7 ....78.50
Ensley,Ala. T2 ....75.50
Fairfield,Ala. T2 ....75.50
Fontana,Calif. K1 ....94.50
Gary,Ind. U5 ....75.50
Geneva,Utah C11 ....75.50
Houston S5 ....85.50
Johnstown,Pa. B2 ....75.50
Lackawanna,N.Y. B2 ....75.50
LosAngeles B3 ....94.50
Munhall,Pa. U5 ....75.50
Seattle B3 ....94.50
So.Chicago R2,U5,W14 75.50
So.Duquesne,Pa. U5 ....75.50
So.SanFrancisco B3 ....94.50

Alloy, Forging (NT)

Bethlehem,Pa. B2 ....$82.00
Buffalo R2 ....82.00
Canton,O. R2 ....82.00
Canton,O. T7 ....84.60
Conshohocken,Pa. A3 ....89.00
Detroit R7 ....84.00
Fontana,Calif. K1 ....101.00
Gary,Ind. U5 ....82.00
Houston S5 ....92.00
Ind.Harbor,Ind. Y1 ....82.00
Johnstown,Pa. B2 ....82.00
Lackawanna,N.Y. B2 ....82.00
LosAngeles B3 ....102.00
Massillon,O. R2 ....82.00
Midland,Pa. C18 ....82.00
Munhall,Pa. U5 ....82.00
So.Chicago R2,U5,W14 82.00
So.Duquesne,Pa. U5 ....82.00
Struthers,O. Y1 ....82.00
Warren,O. C17 ....82.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2 ....$92.50
Canton,O. R2 ....92.50
Cleveland R2 ....92.50
Fontana,Calif. K1 ....113.50
Gary,Ind. U5 ....92.50
Massillon,O. R2 ....92.50
So.Chicago,Ill. R2 ....92.50
So.Duquesne,Pa. U5 ....92.50

SHEET BAR (NT)

Fontana,Calif. K1 ....$93.18

SKELP

Aliquippa,Pa. J5 ....3.85
Munhall,Pa. U5 ....3.75
Warren,O. R2 ....3.75
Youngstown R2, U5 ....3.75

WIRE RODS

AlabamaCity,Ala. R2 ....4.525
Aliquippa,Pa. J5 ....4.525
Alton,Ill. L1 ....4.70
Buffalo W12 ....4.525
Cleveland A7 ....4.525
Donora,Pa. A7 ....4.525
Fairfield,Ala. T2 ....4.525
Fontana,Calif. K1 ....5.325
Houston S5 ....4.925
Johnstown,Pa. B2 ....4.525
Joliet,Ill. A7 ....4.525
KansasCity,Mo. S5 ....4.85
LosAngeles B3 ....5.325
Minnequa,Colo. C10 ....4.775
Monessen,Pa. P7 ....4.725
No.Tonawanda,N.Y. B11 4.525
Pittsburg,Calif. C11 ....5.175
Portsmouth P12 ....4.525
Roebling,N.J. R5 ....4.625
So.Chicago,Ill. R2 ....4.525
SparrowsPoint,Md. B2 ....4.625
Sterling,Ill.(1) N15 ....4.525
Struthers,O. Y1 ....4.525
Torrance,Calif. C11 ....5.325
Worcester,Mass. A7 ....4.825

—STRUCTURALS—

Carbon Steel Stand. Shapes

AlabamaCity,Ala. R2 ....4.10
Aliquippa,Pa. J5 ....4.10
Bessemer,Ala. T2 ....4.10
Bethlehem,Pa. B2 ....4.15
Clairton,Pa. U5 ....4.10
Fairfield,Ala. T2 ....4.10
Fontana,Calif. K1 ....4.72
Gary,Ind. U5 ....4.10
Geneva,Utah C11 ....4.10
Houston S5 ....4.60
Ind.Harbor,Ind. I-2 ....4.10
Johnstown,Pa. B2 ....4.15
KansasCity,Mo. S5 ....4.80
Lackawanna,N.Y. B2 ....4.15
LosAngeles B3 ....4.80
Minnequa,Colo. C10 ....4.55
Munhall,Pa. U5 ....4.10
Niles,Calif.(22) P1 ....4.91
Phoenixville,Pa. P4 ....4.95
Seattle B3 ....4.85
So.Chicago,Ill. U5, W14 4.10
So.SanFrancisco B3 ....4.75
Torrance,Calif. C11 ....4.80
Weirton,W.Va. W6 ....4.35

Wide Flange

Bethlehem,Pa. B2 ....4.15
Clairton,Pa. U5 ....4.10
Fontana,Calif. K1 ....5.30
Lackawanna,N.Y. B2 ....4.15
Munhall,Pa. U5 ....4.10
So.Chicago,Ill. U5 ....4.10

Alloy Stand. Shapes

Clairton,Pa. U5 ....5.00
Fontana,Calif. K1 ....6.40
Gary,Ind. U5 ....5.00
Munhall,Pa. U5 ....5.00
So.Chicago,Ill. U5 ....5.00

H.S., L.A. Stand. Shapes

Aliquippa,Pa. J5 ....6.175
Bessemer,Ala. T2 ....6.175
Bethlehem,Pa. B2 ....6.20
Clairton,Pa. U5 ....6.175
Fairfield,Ala. T2 ....6.175
Fontana,Calif. K1 ....6.825
Gary,Ind. U5 ....6.175
Geneva,Utah C11 ....6.175
Ind.Harbor,Ind. I-2 ....6.175
Ind.Harbor,Ind. Y1 ....6.675
Johnstown,Pa. B2 ....6.20
Lackawanna,N.Y. B2 ....6.20
LosAngeles B3 ....6.85
Munhall,Pa. U5 ....6.175
Seattle B3 ....6.90
So.Chicago,Ill. U5, W14 6.175
So.SanFrancisco B3 ....6.80
Struthers,O. Y1 ....6.675

H.S., L.A. Wide Flange

Bethlehem,Pa. B2 ....6.20
Lackawanna,N.Y. B2 ....6.20
Munhall,Pa. U5 ....6.125
So.Chicago,Ill. U5 ....6.125

BEARING PILES

Munhall,Pa. U5 ....4.10
So.Chicago,Ill. U5 ....4.10

—PILING—

STEEL SHEET PILING

Ind.Harbor,Ind. I-2 ....4.925
Lackawanna,N.Y. B2 ....4.925
Munhall,Pa. U5 ....4.925
So.Chicago,Ill. U5 ....4.925

—PLATES—

PLATES, Carbon Steel

AlabamaCity,Ala. R2 ....4.10
Aliquippa,Pa. J5 ....4.10
Ashland,Ky. (15) A10 ....4.10
Bessemer,Ala. T2 ....4.10
Clairton,Pa. U5 ....4.10
Claymont,Del. C22 ....4.55
Cleveland,Ohio J5, R2 ....4.10
Coatesville,Pa. L7 ....4.35
Conshohocken,Pa. A3 ....4.55
Ecorse,Mich. G5 ....4.65
Fairfield,Ala. T2 ....4.10
Fontana,Calif.(30) K1 ....4.75
Gary,Ind. U5 ....4.10
Granite City,Ill. G4 ....4.60
Harrisburg,Pa. C5 ....4.95
Houston S5 ....4.60
Ind.Harbor,Ind. I-2, Y1 4.10
Johnstown,Pa. B2 ....4.10
Lackawanna,N.Y. B2 ....4.10
Minnequa,Colo. C10 ....4.50
Munhall,Pa. U5 ....4.10
Pittsburgh J5 ....4.10
Riverdale,Ill. A1 ....4.10
Seattle B3 ....5.00
Sharon,Pa. S3 ....4.10
So.Chicago,Ill. U5, W14 4.10
SparrowsPoint,Md. B2 ....4.10
Steubenville,O. W10 ....4.10
Warren,O. R2 ....4.10
Weirton,W.Va. W6 ....4.40
Youngstown R2, U5, Y1 4.10

PLATES, Carbon Abras. Resist.

Fontana,Calif. K1 ....5.90
Geneva,Utah C11 ....5.25

PLATES, Wrought Iron

Economy,Pa. B14 ....9.30

PLATES, High-Strength Low-Alloy

Aliquippa,Pa. J5 ....6.25
Bessemer,Ala. T2 ....6.25
Clairton,Pa. U5 ....6.25
Cleveland J5 ....6.25
Conshohocken,Pa. A3 ....6.50
Ecorse,Mich. G5 ....7.40
Fairfield,Ala. T2 ....6.25
Fontana,Calif.(30) K1 ....6.95
Gary,Ind. U5 ....6.25
Geneva,Utah C11 ....6.25
Ind.Harbor,Ind. I-2 ....6.25
Ind.Harbor,Ind. Y1 ....6.75
Johnstown,Pa. B2 ....6.25
Lackawanna,N.Y. B2 ....6.25
Munhall,Pa. U5 ....6.25
Pittsburgh J5 ....6.25
Seattle B3 ....7.15
Sharon,Pa. S3 ....6.25
So.Chicago,Ill. U5, W14 6.25
SparrowsPoint,Md. B2 ....6.25
Youngstown U5 ....6.25
Youngstown Y1 ....6.75

PLATES, Alloy

Claymont,Del. C22 ....5.65
Coatesville,Pa. L7 ....5.75
Fontana,Calif. K1 ....6.60
Gary,Ind. U5 ....5.55
Johnstown,Pa. B2 ....5.55
Munhall,Pa. U5 ....5.55
Sharon,Pa. S3 ....5.55
So.Chicago,Ill. U5, W14 5.55
SparrowsPoint,Md. B2 ....5.55

FLOOR PLATES

Cleveland J5 ....5.15
Conshohocken,Pa. A3 ....5.15
Ind. Harbor,Ind. I-2 ....5.15
Munhall,Pa. U5 ....5.15
So.Chicago,Ill. U5 ....5.15

PLATES, Ingot Iron

Ashland,c.l. (15) A10 ....4.35
Ashland,l.c.l. (15) A10 ....4.85
Cleveland, c.l. R2 ....4.70
Warren,O. c.l. R2 ....4.70

—BARS—

BARS, Hot-Rolled Carbon

AlabamaCity, Ala. R2 ....4.15
Aliquippa,Pa. J5 ....4.15
Alton,Ill. L1 ....4.35
Atlanta,Ga. A11 ....4.40
Bessemer,Ala. T2 ....4.15
Buffalo R2 ....4.15
Canton,O. R2 ....4.15
Clairton,Pa. U5 ....4.15
Cleveland R2 ....4.15
Detroit R7 ....4.30
Ecorse,Mich. G5 ....4.50
Emeryville,Calif. J7 ....4.90
Fairfield,Ala. T2 ....4.15
Fontana,Calif. K1 ....4.85
Gary,Ind. U5 ....4.15
Houston S5 ....4.65
Ind.Harbor,Ind. I-2, Y1 4.15
Johnstown,Pa. B2 ....4.15
KansasCity,Mo. S5 ....4.85
LosAngeles B3 ....4.85
Mansfield,Mass. B5 ....4.90
Minnequa,Colo. C10 ....4.60
Monessen,Pa. P7 ....4.90
N.Tonawanda,N.Y. B11 ....4.15
Pittsburg,Calif. C11 ....4.85
Pittsburgh J5 ....4.15
Portland,Oreg. O4 ....4.90
Seattle B3, N14 ....4.90
So.Chicago R2, U5, W14 4.15
So.Duquesne,Pa. U5 ....4.15
So.SanFran.,Calif. B3 ....4.90
Sterling,Ill.(1) N15 ....4.15
Struthers,O. Y1 ....4.15
Torrance,Calif. C11 ....4.85
Weirton,W.Va. W6 ....4.30
Youngstown R2, U5 ....4.15

BARS, Hot-Rolled Alloy

Bethlehem,Pa. B2 ....4.875
Buffalo R2 ....4.875
Canton,O. T7 ....5.02
Canton,O. R2 ....4.875
Clairton,Pa. U5 ....4.875
Detroit R7 ....4.975
Ecorse,Mich. G5 ....5.225
Fontana,Calif. K1 ....5.925
Gary,Ind. U5 ....4.875
Houston S5 ....5.375
Ind.Harbor,Ind. I-2, Y1 4.875
Johnstown,Pa. B2 ....4.875
KansasCity,Mo. S5 ....5.575
Lackawanna,N.Y. B2 ....4.875
LosAngeles B3 ....5.925
Massillon,O. R2 ....4.875
Midland,Pa. C18 ....4.875
So.Chicago R2, U5,W14 4.875
So.Duquesne,Pa. U5 ....4.875
Struthers,O. Y1 ....4.875
Warren,O. C17 ....4.875
Youngstown U5 ....4.875

BARS & SMALL SHAPES, H.R.
High-Strength Low-Alloy

Aliquippa,Pa. J5 ....6.225
Bessemer,Ala. T2 ....6.225
Bethlehem,Pa. B2 ....6.225
Clairton,Pa. U5 ....6.225
Ecorse,Mich. G5 ....6.875
Fairfield,Ala. T2 ....6.225
Fontana,Calif. K1 ....7.475
Gary,Ind. U5 ....6.225
Ind.Harb.,Ind. Y1 ....6.725
Ind.Harb. Ind. I-2 ....6.225
Johnstown,Pa. B2 ....6.225
Lackawanna,N.Y. B2 ....6.225
LosAngeles B3 ....6.925
Pittsburgh J5 ....6.225
Seattle B3 ....6.975
So.Chicago W14 ....6.225
So.Duquesne,Pa. U5 ....6.225
So.SanFrancisco B3 ....6.975
Struthers,O. Y1 ....6.725
Youngstown U5 ....6.225

BAR SIZE ANGLES,H.R.CARBON

Bethlehem,Pa. B2 ....4.35

BAR SIZE ANGLES; S. Shapes

Aliquippa,Pa. J5 ....4.15
Atlanta A11 ....4.40
Niles,Calif. P1 ....4.85
SanFrancisco S7 ....5.10

BAR SHAPES, Hot-Rolled Alloy

Clairton,Pa. U5 ....5.00
Fontana,Calif. K1 ....6.00
Gary,Ind. U5 ....5.00
Houston S5 ....5.70
KansasCity S5 ....5.90
Youngstown U5 ....5.00

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 ....5.20
BeaverFalls,Pa. M12, R2 5.20
Buffalo B5 ....5.25
Camden,N.J. P13 ....5.65
Carnegie,Pa. C12 ....5.20
Chicago W18 ....5.20
Cleveland A7, C20 ....5.20
Detroit P17, R7 ....5.35
Detroit B5 ....5.40
Donora,Pa. A7 ....5.20
Elyria,O. W8 ....5.20
FranklinPark,Ill. N5 ....5.20
Gary,Ind. R2 ....5.20
GreenBay,Wis. F7 ....5.185
Hammond,Ind. I-2, M13 5.20
Hartford,Conn. R2 ....5.75
Harvey,Ill. B5 ....5.20
LosAngeles R2 ....6.65
Mansfield,Mass. B5 ....5.75
Massillon,O. R2, R8 ....5.20
Monaca,Pa. S17 ....5.20
Newark,N.J. W18 ....5.65
NewCastle,Pa. (17) B4 ....5.20
Pittsburgh J5 ....5.20
Plymouth,Mich. P5 ....5.45
Putnam,Conn. W18 ....5.75
Readville,Mass. C14 ....5.75
St.Louis,Mo. M5 ....5.50
So.Chicago,Ill. W14 ....5.20
SpringCity,Pa. K3 ....5.65
Struthers,O. Y1 ....5.20
Waukegan,Ill. A7 ....5.20
Worcester,Mass. W19 ....6.10
Youngstown,O. F3, Y1 ....5.20

BARS, Cold-Finished Carbon
(Turned and Ground)

Cumberland,Md. (5), C19 4.45

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 ....6.325
BeaverFalls,Pa. M12 ....6.325
Bethlehem,Pa. B2 ....6.325
Buffalo B5 ....6.325
Camden,N.J. P13 ....6.50
Canton,O. R2 ....6.325
Canton,O. T7 ....6.29
Carnegie,Pa. C12 ....6.00
Chicago W18 ....6.325
Cleveland A7, C20 ....6.325
Detroit P7 ....6.425
Detroit A7 ....6.475
Detroit B5 ....6.525
Donora,Pa. A7 ....6.325
Elyria,O. W8 ....6.325
Gary,Ind. R2 ....6.325
Hammond,Ind. I-2, M13 6.325
Hartford,Conn. R2 ....6.775
Harvey,Ill. B5 ....6.325
Lackawanna,N.Y. B2 ....6.325
Mansfield,Mass. B5 ....6.775
Massillon,O. R2, R8 ....6.325
Midland,Pa. C18 ....6.325
Monaca,Pa. S17 ....6.325
Newark,N.J. W18 ....6.65
Plymouth,Mich. P5 ....6.525
So.Chicago,Ill. R2, W14 6.325
SpringCity,Pa. K3 ....6.475
Struthers,O. Y1 ....6.325
Warren,O. C17 ....6.325
Waukegan,Ill. A7 ....6.325
Worcester,Mass. A7 ....6.625
Youngstown F3, Y1 ....6.325

BARS, Reinforcing (Fabricators)

AlabamaCity,Ala. R2 ....4.15
Atlanta A11 ....4.40
Buffalo R2 ....4.15
Cleveland R2 ....4.15
Emeryville,Calif. J7 ....4.90
Fairfield,Ala. T2 ....4.15
Fontana,Calif. K1 ....4.85
Gary,Ind. U5 ....4.15
Houston S5 ....4.65
Ind.Harbor,Ind. I-2, Y1 4.15
Johnstown,Pa. B2 ....4.15
KansasCity,Mo. S5 ....4.85
Lackawanna,N.Y. B2 ....4.15
LosAngeles B3 ....4.85
Milton,Pa. B6 ....4.15
Minnequa,Colo. C10 ....4.75
Niles,Calif. P1 ....4.85
Pittsburg,Calif. C11 ....4.85
Pittsburgh J5 ....4.15
SandSprings,Okla. S5 ....5.05
Seattle B3, N14 ....4.90
So.Chicago,Ill. R2 ....4.15
So.Duquesne,Pa. U5 ....4.15
So.SanFrancisco B3 ....4.90
SparrowsPoint,Md. B2 ....4.15
Sterling,Ill. (1) N15 ....4.15
Struthers,O. Y1 ....4.15
Torrance,Calif. C11 ....4.85
Youngstown R2, U5 ....4.15

BARS, Reinforcing
(Fabricated, to consumers)

Johnstown,¼-1" B2 ....5.55
KansasCity S5 ....6.35
LosAngeles B3 ....6.15
Marion,O. P11 ....5.55
Seattle N14 ....5.80
Seattle B3 ....6.25
So.SanFrancisco B3 ....6.25
SparrowsPt. ¼-1" B2 ....5.55
Williamsport,Pa. S19 ....5.45

RAIL STEEL BARS

Avis,Pa.(4) J8 ....4.75
ChicagoHts.(3) C2 ....4.50
ChicagoHts.(4) C2 ....4.75
ChicagoHts.(3,4) I-2 ....4.50
FortWorth,Tex.(26) T4 ....4.65
Franklin,Pa.(3) F5 ....4.50
Franklin,Pa.(4) F5 ....4.75
Marion,O.(3) P11 ....4.50
Moline,Ill.(3) R2 ....4.50
Tonawanda(3,4) R12 ....5.00
Williamsport,Pa.(3) S19 5.25
Williamsport,Pa.(4) S19 5.45

BARS, Wrought Iron

Economy,Pa.(S.R.) B14 10.40
Economy,Pa.(D.R.) B14 12.90
Economy(Staybolt) B14 13.20
MeK.Rks.(Staybolt) L5 15.50
MeK.Rks.(S.R.) L5 ....10.40
MeK.Rks.(D.R.) L5 ....14.00

—SHEETS—

SHEETS, Hot Rolled Steel
(18 gage and heavier)

AlabamaCity,Ala. R2 3.925
Ashland,Ky.(8) A10 3.925
Butler,Pa. A10 3.925
Cleveland,O. P2 3.925
Conshohocken,Pa. A3 ....4.05
Detroit M1 ....4.10
Ecorse,Mich. G5 ....4.125
Fairfield,Ala. T2 ....3.925
Fairless,Pa. U5 ....4.025
Fontana,Calif. K1 ....4.70
Gary,Ind. U5 ....3.925
Geneva,Utah C11 ....4.025
GraniteCity,Ill. G4 ....4.30
Ind.Harbor,Ind. I-2, Y1 3.925
Irvin,Pa. U5 ....3.925
Lackawanna,N.Y. B2 3.925
Munhall,Pa. U5 ....3.925

Niles,O. N12 .....5.425
Pittsburg,Calif. C11 ..4.625
Pittsburgh J5 .....3.925
Riverdale,Ill. A1 .....3.925
Sharon,Pa. S3 .....4.225
So.Chicago,Ill. W14 ..3.925
SparrowsPoint,Md. B2..3.925
Steubenville,O. W10 ..3.925
Torrance,Calif. C11 ..4.625
Warren,O. R2 .....3.925
Weirton,W.Va. W6 ...3.925
Youngstown U5, Y1 ..3.925

SHEETS, H.R. (19 gage)

AlabamaCity,Ala. R2 ..5.225
Dover,O. R1 .....5.975
Mansfield,O. E6 .....5.80
Niles,O. N12 .....5.20
Torrance,Calif. C11 ..5.875

SHEETS, H.R. (14 ga. heavier) High-Strength Low-Alloy

Cleveland J5, R2 ....5.90
Conshohocken,Pa. A3 . 6.15
Ecorse,Mich. G5 .....6.375
Fairfield,Ala. T2 .....5.90
Fontana,Calif. K1 .....7.00
Gary,Ind. U5 .....5.90
Ind Harbor,Ind. I-2 ....5.90
Ind Harbor,Ind. Y1 .....6.40
Irvin,Pa. U5 .....5.90
Lackawanna(35) B2 ....5.90
Munhall,Pa. U5 .....5.90
Pittsburgh J5 .....5.90
Sharon,Pa. S3 .....5.90
So.Chicago,Ill. U5 ....5.90
SparrowsPoint(38) B2 ..5.90
Warren,O. R2 .....5.90
Weirton,W.Va. W6 ... 6.175
Youngstown U5 .....5.90
Youngstown Y1 .....6.40

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ..4.175
Cleveland R2 .....4.525
Ind Harbor,Ind. I-2 ..4.175
Warren,O. R2 .....4.525

SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10 .....4.775
Cleveland J5, R2 .....4.775
Ecorse,Mich. G5 .....4.975
Fairfield,Ala. T2 .....4.775
Fairless,Pa. U5 .....4.875
Follansbee,W.Va. F4 ..5.775
Fontana,Calif. K1 ....5.875
Gary,Ind. U5 .....4.775
GraniteCity,Ill. G4 ...5.275
Ind Harbor,Ind. I-2,Y1 4.775
Irvin,Pa. U5 .....4.775
Lackawanna,N.Y. B2 ..4.775
Middletown,O. A10 ....4.775
Pittsburg,Calif. C11 ..5.725
Pittsburgh J5 .....4.775
SparrowsPoint,Md. B2..4.775
Steubenville,O. W10 ...4.775
Warren,O. R2 .....4.775
Weirton,W.Va. W6 ...4.775
Youngstown Y1 .....4.775

SHEETS, Cold-Rolled High-Strength Low-Alloy

Cleveland J5, R2 .....7.225
Ecorse,Mich. G5 .....7.675
Fontana,Calif. K1 ....8.275
Gary,Ind. U5 .....7.225
IndianaHarbor,Ind. Y1 .7.725
Irvin,Pa. U5 .....7.225
Lackawanna(37) B2 ..7.225
Pittsburgh J5 .....7.225
SparrowsPoint(38) B2 7.225
Warren,O. R2 .....7.225
Weirton,W.Va. W6 ....7.475
Youngstown Y1 .....7.725

SHEETS, Cold-Rolled Ingot Iron

Butler,Pa. A10 .....5.275
Cleveland R2 .....5.375
Middletown,O. A10 ....5.275
Warren,O. R2 .....5.375

SHEETS, Gal'd No. 10 Steel

AlabamaCity,Ala. R2 ..5.275
Ashland,Ky.(8) A10 ..5.275
Canton,O. R2 .....5.275
Dover,O. R1 .....5.675
Fairfield,Ala. T2 ....5.275†
Gary,Ind. U5 .....5.275†
GraniteCity,Ill. G4 ....5.475
Ind Harbor,Ind. I-2 ..5.325
Irvin,Pa. U5 .....5.275†
Kokomo,Ind.(13) C16..5.375
MartinsFerry,O. W10 ..5.275
Niles,O. N12 .....5.50
Pittsburg,Calif. C11 ..6.025†
Sharon,Pa. S3 .....5.45
SparrowsPoint,Md. B2 5.275
Steubenville,O. W10 ..5.275
Torrance,Calif. C11 ..6.275†
Weirton,W.Va. W6 ....5.275

†Based on 5c zinc.

SHEETS, Galvanized No. 10 High-Strength Low-Alloy

Irvin,Pa. U5 .....7.925
SparrowsPoint(39) B2 .8.075

SHEETS, Galvanized Ingot Iron No. 10 Flat

Ashland,Ky.(8) A10 ..5.525
Canton,O. R2 .....6.025

SHEETS, Culvert

	Cu Alloy	Cu Fe
Ashland,Ky. A10	6.325	....
Canton,O. R2	6.475	6.925
Fairfield T2	6.075	6.325
Gary,Ind. U5	6.075	6.325
Ind Harbor I-2	6.075	6.325
Irvin,Pa. U5	6.075	6.325
Kokomo,Ind C16	6.525	....
MartinsFry.,O W10	6.075	....
Pitts.,Cal. C11	6.825	....
SparrowsPt. B2	6.075	....
Torrance,Calif.C11	6.825	....

SHEETS, Culvert Pure Iron

Ashland,Ky. A10 .....6.575
Fairfield,Ala. T2 ..... 6.325
MartinsFerry,O. W10 ...6.325

SHEETS, Galvannealed Steel

Canton,O. R2 .....5.825
Irvin,Pa. U5 .....5.825†
Kokomo,Ind.(13) C16 ..5.925
Niles,O. N12 .....6.35

†Based on 5c zinc

SHEETS, ZINCGRIP Steel

Butler,Pa. A10 .....5.525
Middletown,O. A10 ....5.525

SHEETS, ZINCGRIP Ingot Iron

Butler,Pa. A10 .....5.775
Middletown,O. A10 ....5.775

SHEETS, Electrogalvanized

Cleveland R2 (28) ... 6.125
Niles,O. R2 (28) 6.125
Weirton,W.Va. W6 ....5.975

SHEETS, ALUMINIZED

Butler,Pa. A10 .....8.625

SHEETS, Enameling Iron

Ashland,Ky.(8) A10 ...5.175
Cleveland R2 .....5.175
Gary,Ind. U5 .....5.175
GraniteCity,Ill. G4 ...5.575
Ind Harbor,Ind. I-2 ...5.175
Irvin,Pa. U5 .....5.175
Middletown,O. A10 ....5.175
Youngstown Y1 .....5.175

BLUED STOCK, 29 ga.

Yorkville,O. W10 .....7.20
Follansbee,W.Va. F4 ....7.30
Follansbee (23) F4 ..7.175

SHEETS, Long Terne Steel (Commercial Quality)

BeechBott'm,W.Va.W10 5.675
Gary,Ind. U5 .....5.675
Mansfield,O. E6 .....6.25
Middletown,O. A10 ....5.675
Niles,O. N12 .....6.00
Weirton,W.Va. W6 ....5.675

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....6.075

SHEETS, Well Casing

Fontana,Calif. K1 .....6.20

—STRIP—

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ...3.925
Alton,Ill. LI 4.10
Ashland,Ky.(8) A10 ...3.925
Atlanta A11 .....4.175
Bessemer,Ala. T2 .....3.925
Bridgeport,Conn.(10) S15 4.15
Buffalo (25) B2 .....3.925
Butler,Pa. (8) A10 ...3.925
Carnegie,Pa. S18 .....4.425
Conshohocken,Pa. A3 ...4.90
Detroit M1 .....4.40
Ecorse,Mich. G5 .....4.225
Fairfield,Ala. T2 .....3.925
Fontana,Calif. K1 .....4.70
Gary,Ind. U5 .....3.925
Houston,Tex. S5 .....4.425
Ind Harbor,Ind. I-2 Y1 3.925
Johnstown,Pa.(25) B2..3.925
KansasCity,Mo.(9) S5 . 4.625
Lackawanna,N.Y.(32) B2 3.925
LosAngeles(25) B3 .... 4.675
Milton,Pa. B6 .....3.925
Minnequa,Colo. C9 .....4.225
NewBritain(10) S15 .....4.15
N.Tonawanda,N.Y. B11 3.925
Pittsburg,Calif. C11 ....4.675
Riverdale,Ill. A1 .....3.925
SanFrancisco S7 .....5.10
Seattle(25) B3 .....4.925
Seattle N14 .....4.925
Sharon,Pa. S3 .....3.925
So.Chicago,Ill. W14 ....3.925
So.SanFrancisco(25) B3 4.675
SparrowsPoint,Md. B2 3.925
Torrance,Calif. C11 ....4.675
Warren,O. R2 .....3.925
Weirton,W.Va. W6 .....4.025
Youngstown Y1, U5 ..3.925

STRIP, Hot-Rolled Alloy

Bridgeport,Conn.(10) S15 6.45
Carnegie,Pa. S18 .....6.45
Fontana,Calif. K1 .....7.80
Gary,Ind. U5 .....6.40
Houston,Tex. S5 .....6.90
KansasCity,Mo. S5 .....7.10
LosAngeles B3 .....7.60
NewBritn.,Conn.(10) S15 6.45
Sharon,Pa. S3 .....6.40
So.Chicago W14 .....6.40
Youngstown U5 .....6.40

STRIP, Hot-Rolled High-Strength Low-Alloy

Bessemer,Ala. T2 ....5.65
Conshohocken,Pa. A3 ..6.20
Ecorse,Mich. G5 .....6.50
Fairfield,Ala. T2 .....5.65
Fontana,Calif. K1 .....7.05
Gary,Ind. U5 .....5.95
Ind Harbor,Ind. I-2 ....5.95
Ind Harbor,Ind. Y1 .....6.45
Lackawanna,N.Y. B2 ..6.00
LosAngeles(25) B3 .....6.10
Seattle(25) B3 .....6.65
Sharon,Pa. S3 .....5.95
So.SanFrancisco(25) B3 .6.40
SparrowsPoint,Md. B2 .6.00
Warren,O. R2 .....5.95
Weirton,W.Va. W6 ....6.30
Youngstown Y1 .....6.45
Youngstown U5 .....5.95

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ...4.175
Warren,O. R2 .....4.525

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....5.80
Bridgeport,Conn.(10) S15 6.15
Butler,Pa. A10 .....5.45
Cleveland A7, J5 .....5.45
Evanston,Mich. D5 .....5.45
Gilmer,Tex. P20 .....5.80
Detroit M1 .....5.65
Dover,O. G6 .....5.80
Ecorse,Mich. G5 .....5.65
Follansbee,W.Va. F4 ...5.45
Fontana,Calif. K1 .....7.35
FranklinPark,Ill.(40) T6 5.70
Ind Harbor,Ind. I-2 ....5.70
Lackawanna,N.Y. B2 ..5.45
LosAngeles C1 .....7.50
Mattapan,Mass. T6 ....6.30
Middletown,O. A10 ....5.45
NewBedford,Mass. R10 .6.40
NewBritain(10) S15 .... 6.15
NewCastle,Pa. B1 .....5.45
NewCastle,Ca. E5 .....5.80
NewHaven,Conn. A7 ....5.95
NewHaven,Conn. D2 ....6.20
Pawtucket,R.I. B3 .....6.80
Pawtucket,R.I.(21) N8 .6.65
Riverdale,Ill.(40) A1 ..5.70
Rome,N.Y.(26) R6 ....5.45
Sharon,Pa. S3 .....5.45
Sparrowspoint,Md. B2 ..5.45
Trenton,N.J. R5 .....7.00
Wallford,Conn. W2(50) 6.40
Warren,O.(40) T5 .....5.95
Warren,O. R2 .....5.45
Warren,O. S7 .....5.75
Weirton,W.Va. W6 ....5.45
Worcester,Mass. W19 ...7.05
Youngstown C8 .....5.95
Youngstown Y1 .....5.45

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10) S15 12.15
Carnegie,Pa. S18 .....12.00
Cleveland A7 .....12.00
Dover,O. G6 .....12.00
Fontana,Calif. K1 ....13.65
Harrison,N.J. C18 ....12.00
NewBritn,Conn.(10) S15 12.15
Pawtucket,R.I.(11) N8 12.15
Pawtucket,R.I.(12) N8 12.45
Sharon,Pa. S3 .....12.00
Worcester,Mass. A7 ...12.30
Youngstown C8 .....12.00

STRIP, Cold-Rolled High-Strength Low-Alloy

Cleveland J5 .....7.80
Cleveland A7 .....8.15
Dearborn,Mich. D3 ....7.90
Dover,O. G6 .....8.00
Ecorse,Mich. G5 .....8.50
Lackawanna,N.Y. B2 ..8.15
Sharon,Pa. S3 .....7.65
SparrowsPoint,Md. B2 ..8.15
Warren,O. R2 .....7.60
Weirton,W.Va. W6 ....8.30
Youngstown Y1 .....8.30

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....6.05

STRIP, Electrogalvanized

Dover,O. G6 .....5.70
Warren,O. T5 .....5.70
Weirton,W.Va. W6 ....5.45
Youngstown C8 .....5.95

TIGHT COOPERAGE HOOP

Atlanta A11 .....4.65
Riverdale,Ill. A1 .....4.50
Sharon,Pa. S3 .....4.35
Youngstown U5 .....4.35

Key to Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metals Wire Co.
A7 American Steel & Wire
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.
B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Bolardi Steel Corp.
B8 Braeburn Alloy Steel
B10 E. & G. Brooke, Wickwire Spencer Div., Colo. Fuel & Iron
B11 Buffalo Bolt Co. Div., Buffalo-Eclipse Corp.
B12 Buffalo Steel Div. H. K. Porter Co.
B14 A. M. Byers Co.
B15 J. Bishop & Co.
C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept., Wickwire Spencer Steel Division
C23 Charter Wire Products
C24 G. O. Carlson Inc.
D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.
E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.
F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.
G2 Globe Iron Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
H1 Hanna Furnace Corp.
H7 Helical Tube Co.
I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-7 Indiana Steel & Wire Co.
J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.
K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.
L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Tube & Mfg. Co.
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Co.
M16 Md. Fine & Special Wire
M17 Metal Forming Corp.
M18 Milton Electric Steel
N2 National Supply Co.
N3 National Tube Div.
N5 Nelsen Steel & Wire Co.
N6 NewEng.HighCarb.Wire
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N12 Niles Rolling Mill Div.
N14 Northwest Steel Roll. Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.
O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills
P1 Pacific States Steel Corp.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P20 Prod. Steel Strip Corp.
R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons,John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.
S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 StainlessWeldedProducts
S26 Specialty Wire Co. Inc.
T2 Tenn. Coal & Iron Div.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Steel Co.
W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W.Va. Steel & Mfg. Co.
W8 West Auto Mach Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div.,Colo.Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
W19 Worcester Pressed Steel
Y1 Youngstown Sheet&Tube

STRIP, Cold-Finished, Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Beren,O. C7		8.00	8.60	10.55	12.85
Bridgeport,Conn.(10) B15	6.15	8.00	8.60	10.55	12.85
Bristol,Conn. W5			8.90	10.85	
Carnegie,Pa. S18		8.00	8.60	10.55	12.85
Cleveland A7	5.45	7.85	8.60	10.55	12.85
Dearborn,Mich. D3	6.05	8.25	8.85		
Detroit D2	6.45	7.85	8.45	10.55	
Dover,O. G6	6.05	8.00	8.60	10.55	12.85
FranklinPark,Ill. T6	5.80	7.80	8.75	10.70	
Harrison,N.J. C18			8.90	10.85	13.15
Mattapan,Mass. T6	6.30	7.95	8.90	10.85	13.15
Newfirth.,Conn.(10) B15	6.15	8.00	8.60	10.55	12.85
NewCastle,Pa. B4	4.45	8.00	8.60		
NewCastle,Pa. E5	5.95	8.00	8.60	10.55	12.85
Newllaven,Conn. D2	6.70	7.95	8.55	10.50	
NewYork W3		8.20	8.90	10.85	13.15
Pawtucket,R.I. N8:					
Cleve.or'Pitts.Base		8.00	8.60	10.55	12.85
Worcester,Mass.,Base	6.65	7.95	8.90	10.85	13.15
Sharon,Pa. S3		8.00	8.60	10.55	12.85
Trenton,N.J. R5		8.30	8.90	10.85	13.15
Wallingford,Conn. W2	6.65	7.95	8.90	10.85	13.15
Warren,O. T5	6.20	8.00	8.60	10.55	12.85
Weirton,W.Va. W6	5.80	8.00	8.60	10.55	12.85
Worcester,Mass. A7	5.75	7.95	8.90	10.85	13.15
Worcester,Mass. T6	6.30	7.95	8.90	10.85	13.15
Youngstown C8		8.00	8.60	10.55	12.85
Spring Steel (Tempered)					
Bristol,Conn. W1			12.50	15.00	
FranklinPark,Ill. T6			12.50	15.00	18.00
Trenton,N.J. R5			12.50	15.00	18.00
Harrison,N.J. C18			12.50	15.00	18.00
NewYork W3			12.50	15.00	18.00
Worcester,Mass. T6			12.50	15.00	18.00
Youngstown C8			12.50	15.00	18.00

SILICON STEEL

SHEETS, SILICON, H.R. or C.R.(22 Ga.) COILS (cut lengths ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W10 (cut lengths)	...	...	8.35	9.60	10.40
Brackenridge,Pa. A4	...	...	8.85	10.10	10.90
GraniteCity,Ill. G4 (cut lengths)	...	...	8.55	9.80	...
IndianaHarbor,Ind. I-2	8.05	8.35	8.85	(31)	...
Manefield,O. E6 (cut lengths)	7.55	7.85	8.35	9.60	10.40
Newport,Ky. N9 (cut lengths)	...	7.85	8.35	9.60	10.40
Niles,O. N12 (cut lengths)	7.55	7.85	8.35	...	...
Vandergrift,Pa. U5	...	8.35	8.85	10.10	10.90
Warren,O. R2	8.05	8.35	8.85	10.10	10.90
Zanesville,O. A10	...	8.35	8.85	10.10	10.90

SHEETS, SILICON (22 Ga. Base) COILS (Cut Lengths ½c lower)	Transformer Grade 72	65	58	52
BeechBottom,W10 (cut lengths)	10.95	11.50	12.20	13.00
Brackenridge,Pa. A4	11.45	...	...	...
Newport,Ky. N9 (cut lengths)	10.95	...	...	...
Vandergrift,Pa. U5	11.45	12.00	12.70	13.50
Warren,O. R2	11.45	...	...	...
Zanesville,O. A10	11.45	12.00	12.70	13.50
H.P. or C.R. COILS AND CUT LENGTHS, SILICON (22 Ga.)	**T-100**	**T-90**	**T-80**	**T-73**
Butler,Pa. A10 (C.R.)	...	...	16.05	16.55
Vandergrift, Pa. U5	14.00	14.85	15.85	16.35

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.40	$7.65	$8.05
Fairfield,Ala. T2	7.50	7.75	8.15
Fairless,Pa. U5	7.50	7.75	8.15
Gary,Ind. U5	7.40	7.65	8.05
GraniteCity,Ill. G4	7.60	7.85	8.25
IndianaHarbor,Ind. I-2, Y1	7.40	7.65	8.05
Irvin,Pa. U5	7.40	7.65	8.05
Niles,O. R2	7.40	7.65	8.05
Pittsburg,Calif. C11	8.15	8.40	8.80
SparrowsPoint,Md. B2	7.50	7.75	8.15
Weirton,W.Va. W6	7.40	7.65	8.05
Yorkville,O. W10	7.40	7.65	8.05

TIN PLATE, American Coke (Base Box)	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$8.70	$8.95
Fairfield,Ala. T2	8.80	9.05
Fairless,Pa. U5	8.80	9.05
Gary,Ind. U5	8.70	8.95
Ind.Har. I-2, Y1	8.70	8.95
Irvin,Pa. U5	8.70	8.95
Pitts.,Cal. C11	9.45	9.70
Sp.Pt.,Md. B2	8.80	9.05
Warren,O. R2	8.70	...
Weirton,W.Va.W6	8.70	8.95
Yorkville,O. W10	8.70	8.95

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$6.50
Fairfield,Ala. T2	6.60
Fairless,Pa. U5	6.60
Gary,Ind. U5	6.50
GraniteCity,Ill. G4	6.70
Ind.Harbor,Ind. I-2,Y1	6.50
Irvin,Pa. U5	6.50
Niles,O. R2	6.50
Pittsburg,Calif. C11	7.25
SparrowsPoint,Md. B2	6.60
Warren,O. R2	6.50
Weirton,W.Va. W6	6.50
Yorkville,O. W10	6.50

HOLLOWARE ENAMELING Black Plate (29 gage)	
Follansbee,W.Va. F4	6.10
Gary,Ind. U5	6.10
GraniteCity,Ill. G4	6.30
Ind.Harbor,Ind. Y1	6.10
Irvin,Pa. U5	6.10
Yorkville,O. W10	6.55

MANUFACTURING TERNES (Special Coated)	
Fairfield,Ala. T2	$7.85
Gary,Ind. U5	7.75
Irvin,Pa. U5	7.75
Yorkville,O. W10	7.75

MANUFACTURING TERNES, 8 lb (Commercial Quality)	
Gary,Ind. U5	$9.75
Yorkville,O. W10	9.75

MANUFACTURING TERNES, LT. Coated, 6 lb	
Yorkville,O. W10	$8.65

ROOFING SHORT TERNES (8 lb Coated)	
Gary,Ind. U5	9.75

—WIRE—

WIRE, Manufacturers Bright, Low Carbon	
AlabamaCity,Ala. R2	5.525
Aliquippa,Pa. J5	5.525
Alton,Ill. L1	*5.70*
Atlanta A11	5.775
Bartonville,Ill. K4	5.625
Buffalo W12	5.525
Chicago W13	5.525
Cleveland A7, C20	5.525
Crawfordsville,Ind. M8	5.625
Donora,Pa. A7	5.525
Duluth,Minn. A7	5.525
Fairfield,Ala. T2	5.525
Fostoria,O. (24) S1	5.75
Houston S5	5.925
Johnstown,Pa. B2	5.525
Joliet,Ill. A7	5.525
KansasCity,Mo. S5	6.125
Kokomo,Ind. C16	5.625
LosAngeles B3	6.475
Minnequa,Colo. C10	5.775
Monessen,Pa. P7	5.525
No.Tonawanda,B11	5.525
Palmer,Mass. W12	5.825
Pittsburg,Calif. C11	6.475
Portsmouth,O. P12	5.525
Rankin,Pa. A7	5.525
So.Chicago,Ill. R2	5.525
So.SanFrancisco C10	6.475
SparrowsPoint,Md. B2	5.625
Sterling,Ill. (1) N15	5.525
Struthers,O. Y1	5.525
Torrance,Calif. C11	6.475
Waukegan,Ill. A7	5.525
Worcester,Mass. A7	5.825

WIRE, MB Spring, High Carbon	
Aliquippa,Pa. J5	6.925
Alton,Ill. L1	*7.10*
Bartonville,Ill. K4	7.025
Buffalo W12	6.925
Cleveland A7	6.925
Donora,Pa. A7	6.925
Duluth,Minn. A7	6.925
Fostoria,O. S1	6.925
Johnstown,Pa. B2	6.925
Millbury,Mass. (12) N6	8.725
Minnequa,Colo. C10	7.175
Monessen,Pa. P7	6.925
Monessen,Pa. P16	6.95
Muncie,Ind. I-7	7.125
Palmer,Mass. W12	7.225
Pittsburg,Calif. C11	7.875
Portsmouth,O. P12	6.925
Roebling,N.J. R5	7.225
So.Chicago,Ill. R2	6.925
So.SanFran. C10	7.875
SparrowsPt.,Md. B2	7.025
Struthers,O. Y1	6.925
Trenton,N.J. A7	7.225
Waukegan,Ill. A7	6.925
Worcester A7, J4	7.225
Worcester T6, W12	7.225

WIRE, Upholstery Spring	
Aliquippa,Pa. J5	6.625
Alton,Ill. L1	*6.80*
Buffalo W12	6.625
Cleveland A7	6.625
Donora,Pa. A7	6.625
Duluth,Minn. A7	6.625
Johnstown,Pa. B2	6.625
LosAngeles B3	7.575
Minnequa,Colo. C10	6.875
Monessen,Pa. P7, P16	6.625
NewHaven,Conn. A7	6.925
Palmer,Mass. W12	6.925
Pittsburg,Calif. C11	7.575
Portsmouth,O. P12	6.625
Roebling,N.J. R5	6.925
So.Chicago,Ill. R2	6.625
So.SanFrancisco C10	7.575
SparrowsPoint,Md. B2	6.725
Torrance,Calif. C11	7.575
Trenton,N.J. A7	6.925
Waukegan,Ill. A7	6.625
Worcester,Mass. A7	6.925

WIRE, Fine & Weaving (8"Coils)	
Alton,Ill. L1	10.75
Bartonville,Ill. K4	10.65
Buffalo W12	10.55
Chicago W13	10.55
Cleveland A7	10.55
Crawfordsville,Ind. M8	10.55
Fostoria,O. S1	10.55
Johnstown,Pa. B2	10.55
Kokomo,Ind. C16	10.55
Monessen,Pa. P16*	10.55
Muncie,Ind. I-7	10.75
Palmer,Mass. W12	10.85
Roebling,N.J. R5	10.85
So.SanFrancisco C10	10.90
Waukegan,Ill. A7	10.55
Worcester,Mass. A7, T6	10.85

WIRE, Galv'd ACSR for Cores	
Bartonville,Ill. K4	9.50
Johnstown,Pa. B2	9.50
Monessen,Pa. P16	9.50
Muncie,Ind. I-7	9.70
Roebling,N.J. R5	9.80
SparrowsPt.,Md. B2	9.60

ROPE WIRE	(A)
Alton,Ill. L1	9.45
Bartonville,Ill. K4	9.35
Buffalo W12	9.35
Fostoria,O. S1	9.35
Johnstown,Pa. B2	9.35
Monessen,Pa. P7, P16	9.35
Muncie,Ind. I-7	9.55
Palmer,Mass. W12	9.65
Portsmouth,O. P12	9.35
Roebling,N.J. R5	9.65
SparrowsPt. B2	9.45
Struthers,O. Y1	9.35
Worcester J4 T6	9.65

(A) Plow and Mild Plow; add 0.2c for improved plow.

WIRE, Tire Bead	
Alton,Ill. L1	12.75
Bartonville,Ill. K4	12.65
Monessen,Pa. P16	12.00
Roebling,N.J. R5	12.85

WIRE, Cold-Rolled Flat	
Anderson,Ind. G6	7.45
Buffalo W12	7.45
Cleveland A7	7.45
Crawfordsville,Ind. M8	7.55
Dover,O. G6	7.45
Fostoria,O. S1	7.45
Kokomo,Ind. C16	7.55
FranklinPark,Ill. T6	7.60
Massillon,O. R8	7.45
Monessen,Pa. P16	8.00
Monessen,Pa., P7	7.45
Pawtkt.R.I.(12) N8	7.75
Trenton,N.J. R5	7.75
Worcester A7, T6, W12	7.75

WIRE, Merchant Quality (6 to 8 gage)	An'ld.	Galv.
AlabamaCity R2	6.675	7.075
Aliquippa J5	6.675	7.20*
Atlanta A11	6.925	7.475
Bartonville(19)K4	6.675	7.225
Buffalo W12	6.675	7.075
Cleveland A7	6.675	...
CrawfordsvilleM8	6.775	7.325
Donora,Pa. A7	6.675	7.075†
Duluth,Minn. A7	6.675	7.075†
Fairfield T2	6.675	7.075†
Houston,Tex. S5	7.075	7.475
JohnstownB2(48)	6.675	7.225
Joliet,Ill. A7	6.675	7.075†
KansasCity,Mo.S5	7.275	7.675
Kokomo C16	6.775	7.175
LosAngeles B3	7.625	...
Minnequa C10	6.925	7.325**
Monessen P7 (48)	6.675	7.225
Palmer W12	6.975	7.375
Pitts.,Calif. C11	7.625	8.025†
Prtsmth (18) P12	6.675	...
Rankin A7	6.675	7.075†
So.Chicago R2	6.675	6.325
So.S.Fran.(48)C10	7.625	8.025**
Spar'wsPt. B2(48)	6.775	7.325
Sterl'g(1)(48)N15	6.675	7.225
Struthers,O. Y1	6.675	7.175
Worcester A7	6.975	...

* Based on 10c zinc; † 5c zinc; ** Subject to zinc equalization extras.

WIRE (16 gage)	An'ld. Stone	Galv. Stone
Aliquippa J5	10.63	12.72*
Bartonville(19)K4	10.73	12.51
Cleveland A7	12.25	...
Crawfordsville M8	12.50	14.35
Fostoria,O. S1	12.60	14.15
Johnstown B2	12.50	14.35
Kokomo C16	12.60	14.15
Minnequa C10	12.75	14.45**
Palmer,Mass.W12	12.50	14.05
Pitts.,Calif. C11	12.85	14.40†
SparrowsPt. B2	12.60	14.45
Sterling(1) N15	10.73	12.15
Waukegan A7	12.50	14.05†
Worcester A7	12.80	...

* Based on 11c zinc; † 5c zinc; ** Subject to zinc equalization extras.

WIRE, Barbed	Col.
AlabamaCity,Ala. R2	153
Aliquippa J5	150*
Atlanta A11	159
Bartonville,Ill. (19) K4	156
Crawfordsville,Ind. M8	159
Donora,Pa. A7	153†
Duluth,Minn. A7	153†
Fairfield,Ala. T2	153†
Houston,Tex. S5	161
Johnstown,Pa. B2	156
Joliet,Ill. A7	153
KansasCity,Mo. S5	165
Kokomo,Ind. C16	155
Minnequa,Colo. C10	156**
Monessen,Pa. P7	157
Pittsburg,Calif. C11	173†
Rankin,Pa. A7	153†
So.Chicago,Ill. R2	153
S. SanFrancisco C10	173**
SparrowsPoint,Md. B2	158
Sterling,Ill.(1) N15	156

† Based on 5c zinc; * 11c zinc; ** Subject to zinc equalization extras.

WOVEN FENCE, 9-15½ Ga.	Col.
AlabamaCity,Ala. R2	140
Ala.City,Ala. 17 ga. R2	235
Ala.City,Ala. 18 ga. R2	245
Aliqp'pa,Pa.9-14½ga. J5	143*
Atlanta A11	146
Bartonville,Ill.(19) K4	143
Crawfordsville,Ind. M8	145
Donora,Pa. A7	140†
Duluth,Minn. A7	140†
Fairfield,Ala. T2	140†
Houston,Tex. S5	148
Johnstown,Pa. B2	143
Johnstown 17 ga. 6" B2	234
Johnstown, 4" B2	237
Joliet,Ill. A7	140†
KansasCity,Mo. S5	152
Kokomo,Ind. C16	142
Minnequa,Colo. C10	143**
Monessen,Pa. 9 ga. P7	145
Pittsburg,Calif. C11	163†
Rankin,Pa. A7	140†
So.Chicago,Ill. R2	140
Sterling,Ill. (1) N15	143

† Based on 5c zinc; * 11c zinc; ** Subject to zinc equalization extras.

BALE TIES, Single Loop	Col.
AlabamaCity,Ala. R2	149
Atlanta A11	152
Bartonville,Ill.(19) K4	149
Crawfordsville,Ind. M8	151
Donora,Pa.&A7	149
Duluth,Minn. A7	149
Fairfield,Ala. T2	149
Joliet,Ill. A7	149
KansasCity,Mo. S5	161
Kokomo,Ind. C16	151
Minnequa,Colo. C10	154
Pittsburg,Calif. C11	173
So.Chicago,Ill. R2	149
So.SanFran.,Calif. C10	173
SparrowsPoint,Md. B2	151
Sterling,Ill.(1) N15	149

NAILS, Stock To dealers & mfrs. (7)	Col.
AlabamaCity,Ala. R2	131
Aliquippa,Pa. J5	131
Atlanta A11	134
Bartonville,Ill. (19) K4	134
Chicago,Ill. W13	131
Cleveland A9	137
Crawfordsville,Ind. M8	133
Donora,Pa. A7	131
Duluth,Minn. A7	131
Fairfield,Ala. T2	131
Galveston,Tex. D7	139
Houston,Tex. S5	139
Johnstown,Pa. B2	131
Joliet,Ill. A7	131
KansasCity,Mo. S5	143
Kokomo,Ind. C16	133
Minnequa,Colo. C10	136
Monessen,Pa. P7	131
Pittsburg,Calif. C11	150
Portsmouth,O. P12	132
Rankin,Pa. A7	131
So.Chicago,Ill. R2	131
SparrowsPt.,Md. B2	133
Sterling,Ill. (1) N15	131
Worcester,Mass. A7	137

NAILS, Cut (100 lb keg) to dealers (33)	
Conshohocken,Pa. A3	$8.00
Wheeling,W.Va. W10	8.00

STAPLES, Polished, Stock To dealers & mfrs. (7)	Col.
AlabamaCity,Ala. R2	131
Aliquippa,Pa. J5	133
Atlanta A11	136
Bartonville,Ill. (19) K4	133
Crawfordsville,Ind. M8	135
Donora,Pa. A7	133
Duluth,Minn. A7	133
Fairfield,Ala. T2	133
Johnstown,Pa. B2	133
Joliet,Ill. A7	133
Kokomo,Ind. C16	135
Minnequa,Colo. C10	138
Monessen,Pa. P7	133
Pittsburg,Calif. C11	152
Portsmouth,O. P12	132
Rankin,Pa. A7	133
So.Chicago,Ill. R2	131
SparrowsPt.,Md. B2	135
Sterling,Ill. (1) N15	133
Worcester,Mass. A7	139

—FENCE POSTS—

	Col.
ChicagoHts.,Ill. C2 I-2	145
Duluth,Minn. A7 (49)	136
Franklin,Pa. F5	145
Johnstown,Pa. B2	145
Marion,O. P11	145
Minnequa,Colo. C10	150
Moline,Ill. R2	145
So.Chicago,Ill. R2	145
Tonawanda,N.Y. B12	148
Williamsport,Pa. S19	158

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Sizes—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv
Aliquippa, Pa. J5 (‡)	15.75	list	19.75	2.5	22.25	5	23.75	6.5	23.75	6.5	23	5.75	25.5	8.25
Ambridge, Pa. N2 (†)	15.75	...	19.75	...	22.25	...	23.75	...	23.75	...	23	...	25.5	...
Lorain, O. N3 (*)	15.75	4.5	19.75	5.5	22.25	8	23.75	9.5	23.75	9.5	23	8.75	25.5	11.25
Youngstown Y1 (††)	15.75	list	19.75	2.5	22.25	5	23.75	6.5	23.75	6.5	23	5.75	25.5	8.25

ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2 (**)	15.75	0.75	19.75	3	22.25	5.5	23.75	7	23.75	7	23	6.25	25.5	8.75

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Sizes—Inches	⅛		¼		⅜		½		¾		1		1¼		1½	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c		27.5c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28		2.73	
	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv
Aliquippa, Pa. J5 (‡)	...	...	...	...	....	....	26.25	10	29.25	14	31.75	17.5	34.25	18.5	34.75	19.5
Alton, Ill. L1 (§)	...	...	...	...	....	....	24.25	5	27.25	13	29.75	16.5	32.25	17.5	32.75	18.25
Benwood, W. Va. W10(††)	25.5	+0.75	17.75	+8	10.25	+10.75	26.25	10	29.25	14	31.75	17.5	34.25	18.5	34.75	19.5
Butler, Pa. F6 (†)	26.5	+2.75	19.5	+7.25	12.5	+13	....	....	....	....	....	....	....	....	....	....
Etna, Pa. N2 (†)	....	....	....	....	....	....	26.25	7	29.25	11	31.75	14.5	34.25	16.25	34.75	17.25
Fontana, Calif. (§)	...	...	....	....	....	....	13.25	+3	16.25	1	18.75	4.5	21.25	5.5	21.75	6.5
Ind. Harbor Y1 (††)	....	....	....	....	....	....	25.25	9	28.25	13	30.75	16.5	33.25	17.5	33.75	18.5
Lorain, O. N3 (*)	...	...	....	....	....	....	26.25	16	29.25	20	31.75	23.5	34.25	23	34.75	24
Sharon, Pa. S4 (†)	26.5	−0.25	19.5	+4.25	12.5	+8.5	....	....	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	26.25	11	29.25	15	31.75	18.5	34.25	19.25	34.75	20.25
Sparrows Pt., Md. B2 (§)	24.5	+1.75	17.5	+6.25	10.5	+10.5	24.25	8	27.25	12	29.75	15.5	32.25	16.5	32.75	17.5
Youngstown R2 (**)	....	....	....	....	....	....	26.25	11	29.25	15	31.75	18.5	34.25	19.25	34.75	20.25
Youngstown Y1 (††)	....	....	....	....	....	....	26.25	10	29.25	14	31.75	17.5	34.25	18.5	34.75	19.5
Wheatland, Pa. W9 (‡)	24.5	+1.75	17.5	+6.25	10.5	+10.5	26.25	10	29.25	14	31.75	17.5	34.25	18.5	34.75	19.5

Size—Inches	2		2½		3		3½		4	
List Per Ft.	37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft.	3.68		5.82		7.62		9.20		10.89	
	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv	Blk	Galv
Aliquippa, Pa. J5 (‡)	35.25	20	36.75	20	36.75	20	....	....	....	....
Alton, Ill. L1 (§)	33.25	18.75	34.75	18	34.75	18	....	....	....	....
Benwood, W. Va. W10(††)	35.25	20	36.75	20	36.75	20	27.75	10.5	27.75	10.5
Etna, Pa. N2 (†)	35.25	17.25	36.75	18.5	36.75	18.5	27.75	9	27.75	9
Fontana, Calif. K1 (§)	22.25	7	23.75	7	23.75	7	....	....	....	....
Ind. Harbor, Ind. Y1 (††)	34.25	19	35.75	19	35.75	19	....	....	....	....
Lorain, O. N3 (*)	35.25	24.5	36.75	23	36.75	23	....	....	....	....
Sharon, Pa. M6	35.25	20.75	36.75	20.5	36.75	20.5	....	....	....	....
Sparrows Pt., Md. B2 (§)	32.25	18	34.75	18	34.75	18	25.75	8.5	25.75	8.5
Youngstown R2 (**)	35.25	20.75	36.75	20.5	36.75	20.5	27.75	11	27.75	11
Youngstown Y1 (††)	35.25	20	36.75	20	36.75	20	....	....	....	....
Wheatland, Pa. W9 (‡)	35.25	20	36.75	20	36.75	20	....	....	....	....

Galvanized pipe discounts based on zinc price of: (‡), 14c; (§), 11c to under 12c; (*), 5c; (†), 10c to under 11c; (††), 10.50c-11.50c; with discounts adjusted on price of zinc at time of shipment.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	21.31	18.44
1¼	13	....	25.24	18.12
1½	13	23.12	27.89	20.01
1¾	13	26.84	32.37	23.66
2	13	30.08	36.28	26.51
2¼	13	34.18	41.23	29.86
2½	12	37.10	44.75	32.41
2½	12	40.51	48.86	35.70
2¾	12	43.85	52.90	38.66
3	12	45.92	55.39	41.23

RAILWAY MATERIALS

RAILS	Std. No. 1	Std. No. 2	Std. All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	4.325	4.225	4.275	5.20
Ensley,Ala. T2	4.325	4.225	....	5.20
Fairfield,Ala. T2	....	....	....	5.20
Gary,Ind. U5	4.325	4.225	4.275	...
Huntington,W.Va. W7	....	....	....	5.20
IndianaHarbor,Ind. I-2	4.325	4.225	4.275	...
Johnstown,Pa. B2	....	....	....	(16)5.20
Lackawanna,N.Y. B2	4.325	4.225	....	5.20
Minnequa,Colo. C10	4.325	4.125	....	5.70
Steelton,Pa. B2	4.325	4.225	....	...
Williamsport,Pa. S19	....	....	....	5.20

TIE PLATES	
Fairfield,Ala. T2	5.125
Gary,Ind. U5	5.125
Ind Harbor,Ind. I-2	5.125
Lackawanna,N.Y. B2	5.125
Minnequa,Colo. C10	5.125
Pittsburg,Calif. C11	5.275
Seattle B3	5.275
Steelton,Pa. B2	5.125
Torrance,Calif. C11	5.275

TRACK BOLTS (20) Treated	
KansasCity,Mo. S5	11.00
Lebanon,Pa. B2	11.00
Minnequa,Colo. C10	11.00
Pittsburgh OS, P14	11.00

JOINT BARS	
Bessemer,Pa. U5	5.275
Fairfield,Ala. T2	5.275
Ind Harbor,Ind. I-2	5.275
Joliet,Ill. U5	5.275
Lackawanna,N.Y. B2	5.275
Minnequa,Colo. C10	5.275
Steelton,Pa. B2	5.275

AXLES	
Ind Harbor,Ind. S13	6.50
Johnstown,Pa. B2	6.50

STANDARD TRACK SPIKES	
Ind.Harbor,Ind. I-2, Y1	7.05
KansasCity,Mo. S5	7.30
Lebanon,Pa. B2	7.05
Minnequa,Colo. C10	7.05
Pittsburgh Jo	7.05
Seattle B3	7.55
So.Chicago,Ill. R2	7.05
Struthers,O. Y1	7.05
Youngstown R2	7.05

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh; f.o.b. Chicago, and/or freight equalized with Birmingham except where equalization is too great.

Structural ½-in. larger 8.90c
⅝-in. under ..... 26.5 off

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers ..... List

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(F.o.b. midwestern plants, per cent off list for less than case lots to consumers)

6 in. and shorter:
½-in. & smaller diam. 4
⅝-in. & ¾-in. 3
⅞-in. and larger ... 3
Longer than 6 in.:
All diams. ..... +4
Lag bolts, all diams.:
6 in. and shorter.... 12
Over 6 in. long 8
Ribbed Necked Carriage
Black 25
Plow 25
Step, Elevator, Tap and Sleigh Shoe 12
Tire Bolts ..... List
Boiler & Fitting-Up Bolts 23

NUTS

H.P. & C.P., regular & heavy:
Square, all sizes 58
H.P., Hex, regular & heavy:
¾" and smaller 58
⅞" to 1⅛", inclusive 60
1¼" to 1½", inclusive 62
1⅝" and larger 58
C.P. Hex, regular heavy:
All sizes 58
Hot Galv. Nuts (all types):
¾" and smaller 40
⅞" to 1½", inclusive 43
Finished Hex Nuts:
New standard, all sizes 58
Semifinished & Slotted Hex.:
Regular and heavy, all sizes 58

SQUARE HEAD SET SCREWS

(Packaged; per cent off list)

1 in. diam x 6 in. and shorter 34
1 in. and smaller diam. x over 6 in. 20

HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller.... 34
¼-in. diam. & larger.. 14
N.F. thread, all diams. 8

STEEL STOVE BOLTS

(F.o.b. plant, per cent off list in packages)

Plain finish ..... 47.5 & 10
Plated finishes .... 30 & 10

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:
⅝-in. & smaller 38
¾-in. through 1 in. .. 22
Longer than 6 in.:
⅝-in. and smaller .. 20
¾-in. through 1 in.... 7

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛" to 1 7/16": 1 7/16" to 1 15/16" 4.85c; 1 15/16" to 2 7/16" 4.95c.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 gage and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass. base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.147 to 0.249 in.; for gage 0.142 and lighter, 7.85c.
(15) ½" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25c in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) 0.25c off for untreated.
(21) New Haven, Conn., base.
(22) Del. San Francisco Bay area.
(23) 20 Ga., 36" wide.
(24) Deduct 0.10c, finer than 15 Ga.
(25) Bar mill bands.
(26) Reinforcing mill lengths, to fabricators; to consumers, 5.40c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; add 0.55c for universal mill.
(31) Rd. or square edge.
(32) Rd. or square edge.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 15 gage & lighter, 60" & narrower.
(38) 14 gage & lighter, 48" and narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) 6.7 gage.
(43) U post; add 2 cols. for T post.
(50) 0.025 gage; 6.55c for 0.024 to 0.005 gage; 6.65c for 0.069 gage and over.

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as otherwise noted)

Sponge iron:	Cents
98.5% Fe, annealed	18.00
Unannealed	14.50
Swedish, c.l.f. N.Y., c.l., in bags	11.25
Electrolytic iron:	
Annealed, 99.5% Fe	42.50
Unannealed (99+% Fe)	36.50
Unannealed (99+% Fe) (minus 325 mesh)	53.50
Powder Flakes	48.50
Carbonyl Iron:	
97.9-99.8% size 5 to 10 microns	83.00-148.00
Aluminum:	
Carlots, freight allowed	31.00
Atomized, 500 lb drums, freight allowed	34.00
Antimony, 500 lb lots	78.00
Brass, 20-ton lots	29.50-36.50
Bronze, 10-ton lots	51.00-60.00
Copper:	
Electrolytic	43.25
Reduced	43.25
Lead	21.75
Magnesium	75.00-85.00
Manganese:	
Minus 35 mesh	52.00
Minus 100 mesh	57.00
Minus 200 mesh	62.00
Nickel unannealed	89.50
Nickel-Silver 5-ton lots	47.00
Silicon	38.50
Solder	8.50*
Stainless Steel, 302	91.00
Tin	14.00*
Zinc, 10-ton lots	17.50-25.00
Tungsten	Dollars
Melting grade, 99% 60 to 200 mesh:	
1000 lb and over	5.35
Less than 1000 lb	5.50
Chromium, electrolytic 99.9% Cr min.	3.50

*Plus cost of metal.

STAINLESS STEEL MILL PRICES

(Representative prices, cents per pound, subject to current lists of extras)

AISI Type	Rerolling Ingots	Rerolling Slabs, Billets	Forging Billets	Seamless Tube Billets	H.R. Strip	Shapes; H.R. & C.F. Bars, Wire	Plates	Sheets	C.R. Strip; Flat Wire
301	16.25	20.50	29.50	34.25	29.75	35.25	37.25	46.25	38.25
302	17.25	22.75	29.75	34.50	32.00	35.50	37.50	46.50	41.50
302B	18.50	24.50	30.50	34.50	33.00	35.50	37.50	48.75	44.75
303	18.75	24.75	32.25	37.25	36.75	38.25	39.75	48.75	45.50
304	18.25	23.75	31.00	36.00	34.25	37.25	39.75	48.75	43.75
304L	....	....	36.75	....	....	42.75	45.25	54.25	49.00
306	19.50	25.50	....	36.25	37.00	37.50	42.00	51.75	46.75
308	19.75	26.25	35.25	40.75	38.00	42.00	46.00	55.25	48.00
309	26.50	34.75	43.25	49.25	49.25	50.50	53.75	63.50	62.00
309S	28.50	37.50	47.50	54.50	54.00	55.50	59.00	68.50	68.50
310	33.00	43.25	56.75	66.25	67.50	67.50	69.00	72.25	78.75
314	....	....	....	....	....	....	69.00	74.50	....
316	28.00	36.25	46.75	54.50	55.00	55.50	59.00	64.50	66.50
316L	....	....	52.50	....	....	61.00	64.25	70.00	72.00
317	33.00	43.50	56.25	66.75	67.50	68.25	70.75	77.00	79.25
318	33.50	44.00	55.25	64.50	66.25	65.50	68.75	78.00	80.25
321	22.75	29.50	35.25	40.75	42.00	42.00	46.00	55.50	54.50
330	....	....	58.00	....	....	68.50	70.00	73.75	77.75
347	24.50	32.25	39.50	45.75	46.50	46.75	51.25	60.75	59.25
403	....	....	27.00	30.75	....	32.00	34.25	44.00	41.25
405	16.50	21.75	25.25	29.25	30.50	30.25	31.75	42.50	39.75
410	14.00	18.25	24.00	27.75	26.25	28.75	30.00	40.75	34.25
416	....	....	24.50	28.25	....	29.25	30.50	41.25	41.25
420	22.00	28.50	29.25	34.00	35.50	35.00	38.50	49.25	52.75
430	14.25	18.50	24.50	28.25	27.00	29.25	30.50	43.50	34.75
430F	....	18.75	25.00	28.75	....	29.75	31.00	44.00	44.00
431	14.50	28.50	25.00	28.25	27.50	29.25	30.50	44.00	35.25
440A,B,C	....	28.50	29.25	34.00	....	35.00	38.50	49.25	52.75
442	....	....	28.00	....	....	30.50	35.25	48.25	47.75
446	....	....	33.75	38.25	53.00	39.50	40.75	59.75	71.00
501	....	....	14.00	14.50	21.25	16.00	18.25	30.50	29.00
502	....	....	15.25	16.00	22.25	17.00	20.00	31.75	30.00

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Co. Inc., American Steel & Wire Division, U. S. Steel Corp.; Armco Steel Corp.; J. Bishop & Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Charter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Co.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Division, Borg Warner Corp.; Jessop Steel Co.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McLouth Steel Corp.; Metal Forming Corp.; Page Steel & Wire Division, American Chain & Cable Co. Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Stainless Welded Products Inc.; Superior Steel Corp.; Timken Roller Bearing Co.; Tube Methods Inc.; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

CLAD STEEL

Cladding Stainless	Plates—Carbon Base 10%	Plates—Carbon Base 20%	Sheets—Carbon Base 20%	Sheets—Copper Base Both Sides
302	....	31.00	31.00	77.00
304	27.60	32.50-32.70	32.50	77.00
310	36.50	41.00	....	144.00
316	32.60	37.70-42.75	42.75	....
318	37.00	42.20	....	....
321	29.30	34.40-37.00	37.00	111.00
347	30.40	35.50-40.50	40.50	130.00
405	23.40	30.60	....	....
410	22.90	30.10	....	....
430	22.90	30.10	....	....
Inconel	41.23	54.18	....	165.00
Nickel	37.50	50.90	....	....
Monel	38.90	51.80	....	....
Copper*	....	....	46.00	....

	Strip, Carbon Base—Cold-Rolled 10%	Cold-Rolled Both Sides	Hot-Rolled 10%	Hot-Rolled Both Sides
Copper*	27.85	35.85	24.00	32.25

*Deoxidized. Production points: Stainless sheets, New Castle, Ind. 14; stainless-clad plates, Claymont, Del. C22 Coatesville, Pa. L7, New Castle, Ind. 14 and Washington, Pa. J3; nickel, inconel, monel-clad plates Coatesville L7; copper-clad strip, Carnegie, Pa. 818. Production point for copper-base sheets is Carnegie, Pa. A13.

TOOL STEEL

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.25-2.85	5% Cr Hot Work	0.39
Extra Carbon	0.33-.310	W-Cr Hot Work	0.41
Special Carbon	0.35-.360	V-Cr Hot Work	0.43
Oil Hardening	0.370-.39	Hi-Carbon-Cr.	0.665-.70

Grade by Analysis (%)

W	Cr	V	Co	Mo	$ per lb
20	4	2	12	....	4.055
18	4	1	4	....	2.340
18	4	2	9	....	2.565-2.695
18	4	2	....	....	1.820
18	4	1	....	....	1.580-1.660
13.5	4	3	....	....	1.875
6.4	4.5	1.9	....	5	1.065
6	4	3	....	6	1.300
2	1.4	1.2	....	....	0.495
1.5	4	1	....	8.5	0.895

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, J3, L3, M14, S8, U4, V2 and V3.

PIG IRON, Gross Ton

F.o.b. furnace prices as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham District				
AlabamaCity,Ala. R2	52.38	52.88	....	....
Birmingham R2	52.38	52.88	....	....
Birmingham U6	....	52.88	....	....
Woodward,Ala. W15	52.38	52.88	....	....
Cincinnati, del.	....	60.43	....	....
Buffalo District				
Buffalo R2, H1	56.00	56.50	57.00	....
Tonawanda,N.Y. W12	56.00	56.50	57.00	....
No. Tonawanda,N.Y. T9	....	56.50	57.00	....
Boston, del.	66.65	67.15	67.65	....
Rochester,N.Y., del.	59.02	59.52	60.02	....
Syracuse,N.Y., del.	60.12	60.62	61.12	....
Chicago District				
Chicago I-3	56.00	56.50	56.50	57.00
Gary,Ind. U5	56.00	....	56.50	....
IndianaHarbor,Ind. I-2	56.00	....	56.50	....
So.Chicago,Ill. W14, Y1	56.00	56.50	56.50	....
So.Chicago,Ill. U5	56.00	....	56.50	57.00
Milwaukee, del.	58.17	58.67	58.67	59.17
Muskegon,Mich., del.	....	62.80	62.80	....
Cleveland District				
Cleveland A7	56.00	56.50	56.50	57.00
Cleveland R2	56.00	56.50	56.50	....
Akron,O., del. from Cleve.	58.75	59.25	59.25	59.75
Lorain,O. N3	56.00	....	....	57.00
Mid-Atlantic District				
Bethlehem,Pa. B4	$58.00	$58.50	$59.00	$59.50
New York, del.	....	62.28	62.78	....
Newark, del.	61.02	61.52	62.02	62.52
Philadelphia, del.	60.75	61.25	61.75	62.25
Bridgeport,Pa. B10	58.00	58.50	....	....
Steelton,Pa. B2	58.00	58.50	59.00	59.50
Swedeland,Pa. A3	58.00	58.50	59.00	59.50
Troy,N.Y. R2	58.00	58.50	59.00	....
Pittsburgh District				
Neville Island,Pa. P6	56.00	56.50	56.50	....
Pitts.,N.&S. sides, Ambridge, Aliquippa, del.	57.37	57.87	57.87	....
McKeesRocks, del.	57.04	57.54	57.54	....
Lawrenceville, Homestead, Wilmerding, Monaca, del.	57.66	58.16	58.16	....
Verona, Trafford, del.	58.19	58.69	58.69	....
Brackenridge, del.	58.45	58.95	58.95	....
Bessemer,Pa. U5	56.00	....	56.50	57.00
Clairton,Rankin,So.Duquesne,Pa. U5	56.00	....	....	....
McKeesport,Pa. N3	56.00	....	....	57.00
Midland,Pa. C18	56.00	....	....	....
Monessen,Pa. P7	56.00	....	....	....
Youngstown District				
Hubbard,O. Y1	....	....	56.50	....
Sharpsville,Pa. S6	56.00	56.50	56.50	57.00
Youngstown, Y1	....	....	56.50	57.00
Youngstown U5	56.00	....	....	57.00
Mansfield,O., del.	60.90	....	61.40	61.90
Duluth I-3	56.00	56.50	56.50	57.00
Erie,Pa. I-3	56.00	56.50	56.50	57.00
Everett,Mass. E1	....	67.00	67.50	....
Fontana,Calif. K1	62.00	62.50	....	....
Geneva,Utah C11	57.50	58.00	....	....
GraniteCity,Ill. G4	57.90	58.40	58.90	....
Ironton,Utah C11	56.00	56.50	....	....
LoneStar,Texas L6	52.00	52.50*	52.50	....
Minnequa,Colo. C10	58.00	59.00	59.00	....
Rockwood,Tenn. T3	....	....	56.50	....
Toledo,O. I-3	56.00	56.50	56.50	57.00
Cincinnati, del.	61.76	62.26	....	....

*Low phos. southern grade.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.0-6.50% silicon; add $1.50 for each 0.5% Si; 75 cents for each 0.5% Mn over 1%)

Jackson,O. G2, J1	$67.00
Buffalo H1	68.25

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

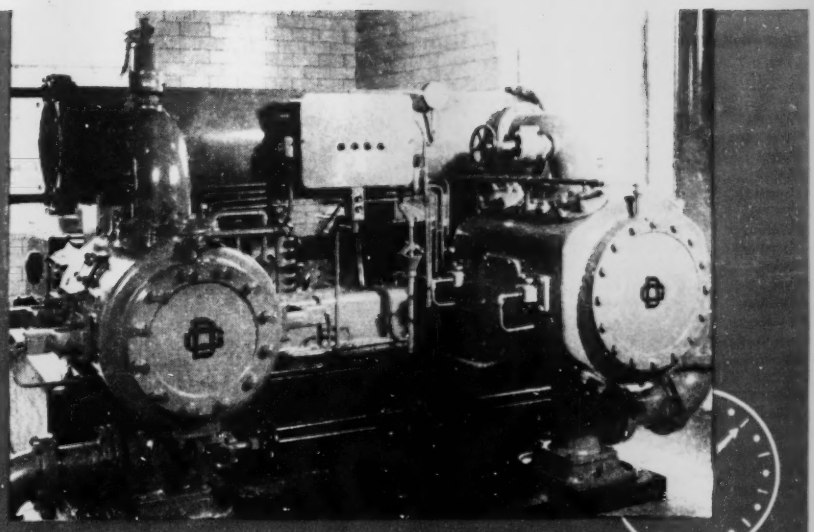
(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.45 for each 0.5% Mn over 1%; $2 per gross ton premium for 0.045% max P.)

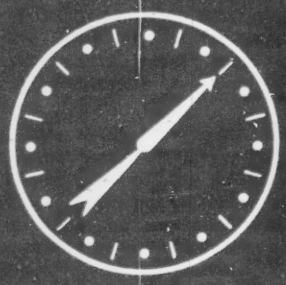
NiagaraFalls,N.Y. P15	$91.00
Keokuk,Iowa, Openhearth & Fdry, freight allowed K2	95.50
Keokuk, OH & Fdry, 12½ lb piglets, 16% Si, frt. allowed K2	98.50
Wenatchee,Wash., OH & Fdry, freight allowed K2	95.50

LOW PHOSPHORUS PIG IRON, Gross Ton

Cleveland, intermediate, A7	$81.00
Rockwood,Tenn. T3	70.00
Steelton,Pa. B2	84.00
Philadelphia, delivered	87.35
Troy,N.Y. R2	84.00

Model RA
688 to 1854 c.f.m. displacement
Bulletin HAC-38

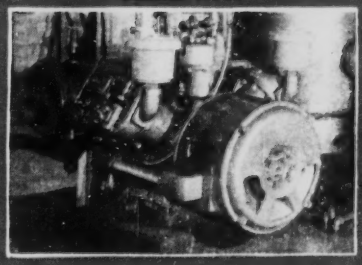


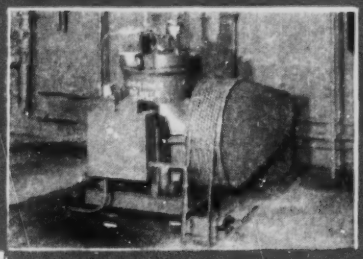


PRESSURE:	Holding up
OUTPUT:	Up to capacity
EFFICIENCY:	Right up there
OPERATION:	Downright economical
MAINTENANCE:	Trifling

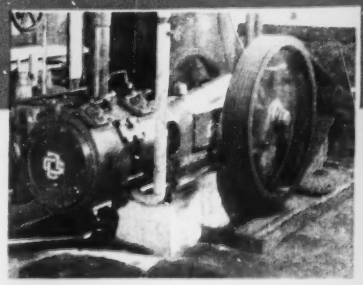
For everyday compressor reports like this—
choose GARDNER-DENVER.
Write for descriptive bulletins.

Model WB
142 to 838 c.f.m. displacement
Bulletin WB-10





Model AA
32 to 153.8 c.f.m. displacement
Bulletin AA-8



Model RX
89 to 1292 c.f.m. displacement
Bulletin HAC-40

GARDNER-DENVER SINCE 1859

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd.,
14 Curity Avenue, Toronto 13, Ontario

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

WAREHOUSE STEEL PRODUCTS

(Representative prices, cents per pound, subject to extras, f.o.b. warehouse. City delivery charges are 20 cents per 100 lb except: New York, 30 cents; Philadelphia, 25 cents; Birmingham, Cincinnati, St. Paul, 15 cents.)

	SHEETS			STRIP		BARS			Standard Structural Shapes	PLATES	
	Hot Rolled	Cold Rolled	Gal. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.‡	H.R. Alloy 4140††[5]		Carbon	Floor
Baltimore	6.29	7.64	7.81	7.00	...	6.86	8.17[6]	12.04	6.98	6.85	7.98
Birmingham	6.19	7.09	8.00[3]	6.30	...	6.15	8.90	...	6.35	6.35	8.65
Boston	6.49	7.83	9.18	7.13	...	6.87	8.35	12.28	7.06	7.13	8.26
Buffalo	6.18	7.13	8.96	6.70	...	6.35	7.70	12.17	6.59	6.68	7.88
Charlotte, N. C.	6.55	7.80	8.69	6.90	...	7.10	8.37	....	7.10	7.10	8.37
Chicago	6.18	7.12	8.00	6.42	...	6.28	7.30	11.75	6.46	6.33	7.46
Cincinnati	6.51	7.19	8.42	6.72	...	6.58	7.66	12.17	6.93	6.89	7.88
Cleveland	6.18	7.12	7.90	6.58	...	6.34	7.65	11.89	6.79	6.50	7.79
Detroit	6.38	7.31	8.29	6.71	7.56	6.56	7.60	11.92	6.93	6.85	7.80
Erie, Pa.	6.19	7.13	9.01	6.54	...	6.28	7.70	....	6.56	6.50	7.79
Houston	7.15	7.85	9.32	7.45	...	7.45	....	....	7.35	7.20	8.55
Jersey City, N. J.	6.54	7.45	8.72	6.82	...	6.75	8.43[6]	11.84	6.50	6.67	8.01
Los Angeles	7.25	9.00	9.35	7.55	11.20	7.15	9.10	13.05	7.35	7.20	9.25
Milwaukee	6.35	7.29	8.22	6.59	...	6.45	7.57	11.92	6.63	6.50	7.63
Moline, Ill.	6.53	7.47	8.40	6.77	...	6.63	7.65	....	6.81	6.68	...
New York	6.54	7.45	8.42	6.82	...	6.75	8.43[6]	11.84	6.50	6.67	8.01
Newark, N. J.	6.78	7.75	9.02	7.16	...	7.06	8.43[6]	....	6.90	6.99	8.30
Norfolk, Va.	6.90	...	...	7.20	...	7.20	8.50	....	7.20	7.15	7.85
Philadelphia	6.55	7.55	8.41	7.02	8.80	6.87	8.19[6]	11.89	6.67	6.63	7.65
Pittsburgh	6.18	7.12	8.30	6.55	...	6.28	7.65	11.89	6.46	6.33	7.46
Portland, Oreg.	7.90	9.30	10.00	7.90	...	7.60	10.65	....	7.50	7.55	9.40
Richmond, Va.	6.50	7.45	8.00	7.10	...	7.05	7.95	....	7.10	6.85	8.10
St. Louis	6.48	7.42	8.30	6.72	...	6.58	7.70	12.05	6.86	6.73	7.86
St. Paul	6.84	7.78	8.71	7.08	...	6.94	8.06	....	7.12	6.99	8.12
San Francisco	7.35	8.70	10.15	7.60	...	7.15	9.75	13.05	7.25	7.20	9.25
Seattle	7.10	9.70	9.50	8.05	...	7.55	10.13	13.50	7.50	7.59	9.40
Spokane	7.45	9.25	9.60	8.00	...	7.60	11.00[8]	14.15	7.25	7.35	9.80
Washington	6.71	8.15	8.35	7.51	...	7.37	8.43	....	7.49	7.36	8.49

*Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gages extra excluded); ‡ includes 35-cent special bar quality extra; § as rolled; †† as annealed; ** ⅜" and heavier, 8.09c for No. 12 and lighter. Base quantities, 2000 to 9999 lb except as noted. Cold-rolled strip, 2000 lb and over; Cold-finished bars, 2000 lb and over; [2]—500 to 9999 lb; [5]—1000 to 1999 lb; [6]—1000 lb and over; [7]—1500 lb to 3499; [8]—under ½ in.

Distributors Buying Cautiously

With over-all inventories approaching 100 per cent normal, warehouses seek to obtain better balance sizewise. Distribution of nickel-bearing items on free basis

Cleveland Warehouse order volume continues substantial though some distributors report their over-all business is off about ⅓ as compared with a year ago at this time. In general, orders are smaller with consumers more inventory-conscious than they have been for a long time past. Further, with supplies easier to obtain they are unwilling to accept any kind of steel offered them. It must meet specifications.

Distributors' stocks have been improving for some months past and while all products are not in balance as regards size, they are inclined to add to inventories more carefully than heretofore.

Prices are firm, except second sheets are reportedly being offered consumers below former levels. This is not unusual with this grade of material. Actually, it is reported some mills are finding it so difficult to market seconds they are consuming substantial tonnage as scrap.

Chicago Warehouses are enthusiastic over the ending of nickel controls, effective Nov. 1. It means after that date nickel-bearing stainless can be distributed freely. Expectations are the switch from straight chrome types will be so universal voluntary customer quotas may have to be imposed for a while.

For some time distributors have been preparing for decontrol. They have been building inventories of chrome-nickel types as fast as possible. At the same time, stocks of straight chrome types have been worked down.

Philadelphia October is usually one of the best months of the year for distributors. Hence, the general expectation here is demand will show an increase over September.

With few exceptions consumers are cutting their commitments.

From the standpoint of over-all tonnage warehouse inventories are about 100 per cent normal. Sizewise, however, they are still not back to that point.

New York Warehouse sales are improving, but orders are not up to first half level. Consumers are getting back to normal pattern in buying from warehouse. Many distributors are placing orders on a month-to-month basis. Alloy demand is relatively slower than that for carbon steel. Pipe sellers are well supplied on buttweld.

Erie, Pa. Local warehouses have established this point as a base for pricing warehouse steel products. Representative f.o.b. warehouse prices quoted are: Hot-rolled sheets, $6.19; cold-rolled sheets, $7.13; galvanized sheets (10 gage) $9.01; hot-rolled strip, $6.54; hot-rolled bars, $6.28; cold-finished bars, $7.70; standard structural shapes, $6.56; carbon plates, $6.50; floor plate, $7.79. For city delivery add 20 cents.

Cincinnati Warehouses appear headed for balanced inventories in fourth quarter. Mill deliveries have improved. The distributors have become as discriminating in buying as steel consumers.

Seattle Warehouse order volume was not up to expectations last month. Increasing competition is in evidence. Inventories are improving. Plates and wide flange beams are still hard to obtain.

Los Angeles Distributors are gratifying almost every whim of consumers. Fabricators are accepting all the services distributors have to offer, but are still ordering steel close to the vest. Consequently, warehouse sales are dull.

San Francisco Some warehouses have been paying premium prices for plates. Unable to obtain sufficient quantities from local mills they have been bringing them in from the East and absorbing some of the freight. This is one steel item not yet near the adequacy stage. Stocks are building up, generally, and there are a number of soft spots in demand.

Sheetmakers Hold Substantial Backlogs

Active fourth quarter in prospect for mills despite slowing down of demand from some directions. Some freight absorption expected as competitive conditions intensify

Sheet and Strip Prices, Page 356 & 357

Cleveland Sheetmakers entered fourth quarter with substantial carryover in most light, flat-rolled products, and order books of most producers are filled for the remainder of the year. Some report they are in receipt of requests for spot tonnage above quotas.

Books have been opened for first quarter tonnage and the larger mills report business is coming in at a rate to indicate the period will be as active for them as currently. The premium-priced sellers, however, reportedly are having difficulty filling their books.

Continued demand pressure for sheets in the face of a slowing down in automotive and other consuming lines is explained by the fact buyers are switching tonnage to mills more favorably located to them freightwise.

Another factor for continued strong demand on the larger mills is the fact buying of high-priced foreign steel has just about ended. Diversion of such demand to the domestic mills is helping make up any slack occasioned by a slowing down in business generally.

Boston Narrow cold strip converters are deferring hot-rolled shipments in some cases. Connecticut producer of hot-rolled reduced its price on carbon grades. Selling on a Pittsburgh base, its price is now 4.15c compared with 4.425c formerly.

New York Some sellers of hot-rolled and cold-rolled sheets are receiving fewer cutbacks and cancellations than recently. New orders, while not as heavy as a month or two ago, are far from light.

Lifting of government restrictions on civilian use of nickel Nov. 1 will provide a diversity of outlets which do not currently exist. There may be little increase in the amount of nickel available for civilian uses in the immediate future, but even so, a start will have been made and before yearend supply definitely will have become more adequate.

Priority for the military services, Atomic Energy Commission and the government stockpile needs will remain in effect. These priority requirements may be less heavy.

Philadelphia Leading sheet producers have considerable fourth quarter tonnage on books, especially hot-rolled and cold-rolled sheets, but most can schedule additional business. This is especially true with regard to galvanized sheets, stainless steel and certain specialties.

Some freight absorption is reported. Mills have opened books for first quarter, in practically all cases for the entire period, rather than on a month-to-month basis.

Pittsburgh Producers are confident of active sales in fourth quarter. Demand remains strong enough to classify sheet as a sellers' market.

Detroit Mills report sheet and strip are coming into easy supply. Many foreign and conversion steel deals could not be cancelled during third quarter, and some automakers, holding higher inventories than desirable, are buying less sheet.

Cincinnati Smaller mills are having trouble getting orders for sheets while the larger mills are operating at levels in excess of 90 per cent of capacity.

Chicago Demand for cold-rolled sheets continues so strong that one local producer will have no additional tonnage available for users in fourth quarter. Demand is such that customers' quotas probably will have to be retained in first quarter.

Ralston Steel Corp., this city, has booked an order for 1500 tons of 18-gage galvanized sheets, 18 by 120-inch, for use in construction of ventilating and air-conditioning systems for the Atomic Energy Commission. The steel will cost an estimated $250,000.

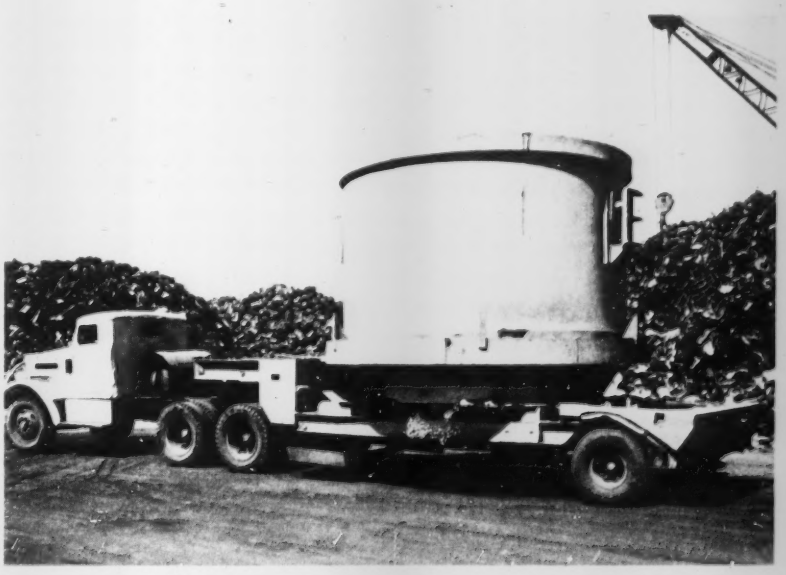
St. Louis Sheet demand continues to soften with increasing order cancellations, some of which is due to delayed deliveries caused by one mill's shutdown for equipment improvements. Galvanized sheets are still under insistent demand.

Plates . . .

Plate Prices, Page 356

New York Some plate sellers have not opened books for first quarter on commercial tonnage, but are expected to do so within a week. They are winding up bookings for the current quarter and expect to have enough tonnage to assure full operations for remainder of the year.

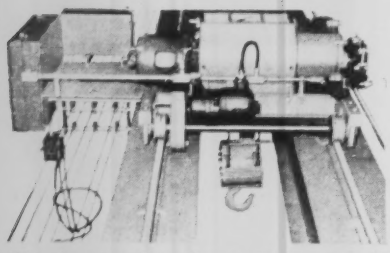
Pittsburgh Producers have no order worries for fourth quarter. Demand is heavy although on a lower level than earlier this year. Some fabricators can fill their requirements



Automatic Weighing Reduces Scrap Preparation Time

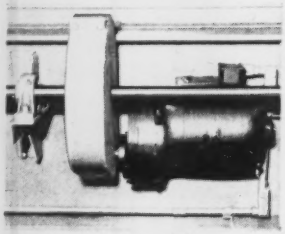
Electric arc steelmaking furnaces at Bethlehem Pacific Coast Steel Corp.'s plant in Los Angeles receive charges of scrap steel from loading buckets like the one shown above. Constant, accurate weight readings are provided by use of load cell units under the bucket, an arrangement developed by Bethlehem Pacific engineers. Charges upwards of 50 tons each are thus handled, reducing considerably time required to prepare scrap for the furnaces

Investigate the Economy of a EUCLID Utility CRANE



For intermediate demands in material handling, Euclid Utility Cranes meet all requirements.

Here for example, is a 54 ft. span double-girder crane in which the hoist is a standard Euclid unit of long proven merit. Geared head motors of widely accepted high quality are used to propel the bridge and the hoist trolley. Control is by push-buttons from the floor.



This construction provides a crane with a full safety factor of five that measures up to all demands in capacity, performance and serviceability; and also effects economies in first cost, in operation and maintenance.

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EUCLID CRANES AND HOISTS "Raise Profits"

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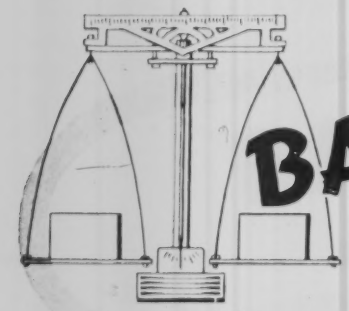

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for the first time in a year with extra tonnages offered from a nearby producer.

Philadelphia—Absorption of freight is not expected to figure much in the plate market for the time being. Most producers are booked for fourth quarter.

Wire . . .

Wire Prices, Page 358

Pittsburgh — Sales of merchant and manufacturers wire products are picking up, following a sharp slump. Renewed interest is shown in merchant wire from farmers, while demand from the construction industry is gaining.

Steel Bars . . .

Bar Prices, Page 356

Philadelphia — Although car producers look for good operations through remainder of the year some order cancellations are noted as well as an increasing number of shipment deferments, some until after the first of the year with a view to keeping yearend inventories down for tax purposes.

Bar supply has been eased by further reduction in shell requirements, affecting principally larger diameters, scarce until recently.

Freight absorption by some bar mills is going on, but there may not be too much of it for a while.

New York—Recent announcement by U. S. Steel Corp. of its intention to absorb freight if necessary or desirable in meeting competition has resulted in other leading producers adopting similar policy.

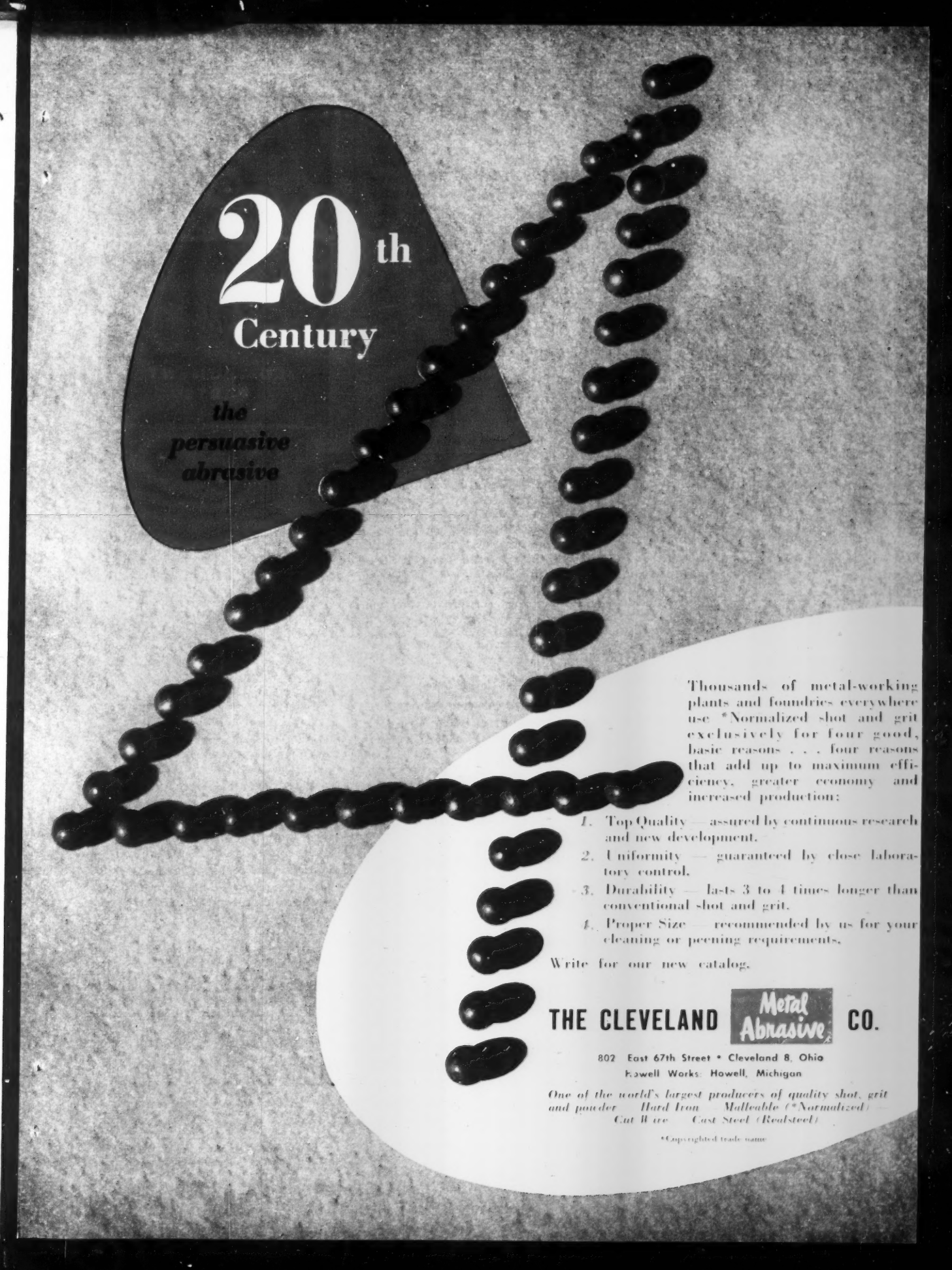
The leading eastern producer will continue its present method of pricing bars and all other rolled steel products on an f.o.b. mill basis. It contemplates no over-all change in policy. However, in certain instances it may quote prices on a delivered basis.

Pittsburgh—Activity is slow, especially in alloy products. Automakers have cut orders, due to inventory adjustment—using up stocks before new models appear. Other consumers tend to favor lower inventories.

Cleveland — Demand pressure for bars is off, but producers entered fourth quarter with substantial carryover, which, with new bookings, assures high-level operations through remainder of the year.

With consumers inventory-conscious, sellers have to do more selling to get in new orders than has been necessary for a long time past even though supply-demand balance has not yet been fully struck in this market.

Alloy bars are available for fourth



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quarter shipment with some producers now holding only 2-months order backlog as against 4-months a short time back.

Semifinished Steel . . .

Semifinished Prices, Page 356

Chicago Softer demand for some steel products is reflected in this district's production of steel ingots. For the week ended Oct. 10 the rate is 95.5 per cent of capacity, down 3 points from the revised rate of 98.5 per cent for the previous week.

Installation of a new blooming mill by Inland Steel is holding operations down about 2 points but three other companies have some cold furnaces because they are not needed to meet demand. These include Republic, Youngstown Sheet & Tube, and Wisconsin Steel.

Republic suffered a 4-day interruption to ingot output in the week ended Oct. 3 when about 250 workers shut down all operating open hearths and electric furnaces by an unauthorized strike. Loss was 7790 ingot tons.

Cleveland A 1-day wildcat strike at the local works of Republic Steel Corp. resulted in a loss of 10,000 tons of ingots last week. Work was resumed pending working out of the labor controversy and the plant again is operating 100 per cent of open-hearth capacity.

Structural Shapes . . .

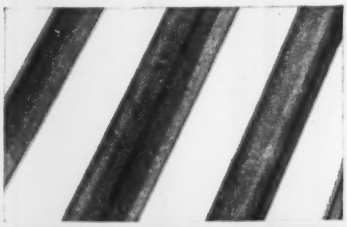
Structural Shape Prices, Page 356

Boston Inquiries have increased slightly. Tonnage involved is substantially higher led by a 2500-ton power house extension, Devon, Conn. Harris Structural Steel Co., New York, is low on a bridge superstructure, Westfield river, Agawam, Mass., 3000 tons. Bulk of pending tonnage is public work, bridges, with a spurt in military inquiry, hangars.

New York Structurals are off seasonally, but substantial volume is being figured. Bridge work leads. Larger shops have backlogs sufficient to carry them through the winter, but they are picking up small jobs when they can be worked into schedules. Small fabricating shops, with backlogs not too extended, are competing actively. Largest recent local award involved 3665 tons for a hospital addition on Wards Island.

Philadelphia Cushioning the seasonal decline in structural business is a good volume of bridge work and a moderate amount of miscellaneous private construction.

Shapes are in tight supply, although most fabricators report stocks slowly getting into balance. Strin-



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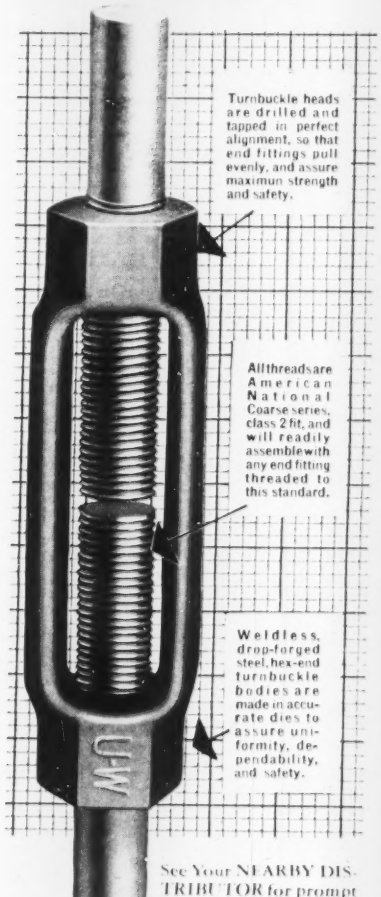

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gency in wide flange sections represents the major difficulty. Some modified wide flange sections, ranging up to about 16 inches, are offered, by the Weirton, W. Va., producer for the first time in a long while. These sections are rolled on a standard mill.

Pittsburgh Structural shape supply is easing slowly. Wide flange beams remain in the scarce category. Building schedules are well-filled in this area.

Los Angeles Demand for wide-flange structural shapes, the tightest of all steel products, will be sustained by Los Angeles county's proposed 10-year construction program involving expenditures of $516 million.

Seattle Structural fabricators are busy but order backlogs are declining and new business is actively sought.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 356

Philadelphia Reinforcing bar demand is sustained and includes 100 tons for the Benson apartments, this city.

Iron Ore . . .

Iron Ore Prices, Page 371

Cleveland The weekly movement of iron ore from the head of the lakes is beginning to taper off. Shipments in the latest week, that ended Oct. 5, totaled 2,927,090 gross tons, a decline of 150,053 tons compared with shipments of 3,077,143 tons in the preceding week.

Total movement in the 1953 season to date now stands at 80,869,939 tons. At this time a year ago only 53,754,954 tons had been brought down.

September shipments of Lake Superior ore amounted to 13,213,573 gross tons, the Lake Superior Iron Ore Association reports. This was a decline of 1,175,052 tons compared with movement of 14,388,625 tons in September a year ago following the ending of the steel strike.

Iron ore unloadings at U. S. Steel's docks at Conneaut, O., in the 1953 lake shipping season to Oct. 1 totaled 10,313,000 gross tons. This exceeds the previous record for a comparable period, set in 1944, by 9,103,000 gross tons. Unloadings at the docks in September of 1,925,000 gross tons were the second largest in the history of the Pittsburgh & Conneaut Dock Co., U. S. Steel subsidiary that operates the docks. The all-time monthly high record was set in July 1944, when 1,944,000 tons were unloaded. The season unloading record for the dock of 12,565,000 gross tons was established in 1942.

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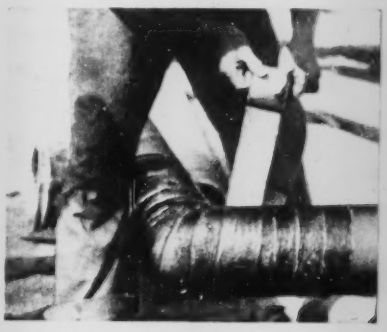

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CURRENT FERROALLOY QUOTATIONS

Prices as reported to STEEL

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton $86, Palmerton, Pa., $87 Clairton and Duquesne, Pa.

Standard Ferromanganese: (Mn 74-76%, C 7% approx.) Base price per net ton $200, Clairton, Duquesne, Johnstown and Sheridan, Pa.; add or subtract $2.00 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively.
(Mn 76-80%) 13.1c per pound of contained Mn, f.o.b. Alloy, W. Va., Ashtabula, Marietta, O., Sheffield, Ala.; and Portland Oreg.
(Mn 79-81%) Lump $208 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%, C 0.07% max.) Carload, lump, bulk, max. 0.07% C, 27.95c per lb of contained Mn, carload packed 28.7c, ton lots 29.8c, less ton 31.0c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices. 1c for max. 0.30% C, 1.5c for max 0.50% C, and 4.5c for max 75% C max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max) Add 2.05c to the above prices. Spot, add 0.25c.

Medium Carbon Ferromanganese: (Mn 80-85, C 1.5% max.) Carload, lump, bulk 21.35c per lb of contained Mn, carload packed 22.1c, ton lots 23.2c, less ton 24.4c. Delivered. Spot, add 0.25c.

Manganese metal, 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2% max) Carload, lump, bulk, 36.2c per lb of metal; packed, 36.95c; ton lot 38.45c; less ton lots 40.45c. Delivered. Spot, add 2c.

Electromanganese: Carload, 31.5c; ton lots 33.5c; 250 to 1999 lb, 35.5c. Premium for hydrogen-removed metal, 1.5c per pound, f.o.b. cars Knoxville, Tenn. Freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%) Contract, lump, bulk 1.50% C grade, 18-20% Si, 11.4c per lb of alloy, carload packed 12.15c, ton lots 13.0c, less ton 14.0c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max) Contract, ton lots 2" x D, $1.50 per lb of contained Ti, less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max) Ton lots $1.35, less ton $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%) Contract $177 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2.5-3%) Contract $196 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High Carbon Ferrochrome: Contract, c.l., lump, bulk 24.7c per lb of contained Cr, c.l. packed 25.6c, ton lot 26.30c, less ton 28.20c. Delivered. Spot, add 0.25c.

Low Carbon Ferrochrome: (Cr 67-72%) Contract, carload, lump, bulk, max. 0.025% C (simplex) 34.50c per lb contained Cr, 0.03% C 36.50c, 0.04% C 35.50c, 0.06% C 34.50c, 0.10% C 34.00c, 0.15% C 33.75c, 0.20% C 33.50c, 0.50% C 33.25c, 1% C 33.00c, 1.50% C 32.85c, 2% C 32.75c. Carload packed add 1.1c, ton lot 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High Carbon: (Cr 62-66%, C 5-7%) Contract, c.l. S M x D, bulk, 26.25c per lb contained Cr. Packed, c.l. 27.1c, ton 28.50c, less ton 30.25c. Delivered Spot, add 0.25c.

Foundry Ferrochrome, Low Carbon: (Cr 59-64%, Si 28-32%, C 1.25% max) Contract, carload, packed, S M x D, 18.35c per lb of alloy, ton lot 19.2c, less ton lot, 20.4c, delivered, spot, add 0.25c.

Low Carbon Ferrochrome Silicon: (Cr 34-41%, Si 42-47%, C 0.05% max) Contract, carload, lump, 4" x down and 2" x down, bulk, 25.7c per lb of contained chromium plus 12.4c per pound of contained silicon; 1" x down, bulk 25.9c per pound of contained chromium plus 12.6c per pound of contained silicon. F.o.b. plant, freight allowed to destination.

Ferrochrome Silicon, No. 2: (Cr 36-39%, Si 26-30%, Al 7-9%, C 0.05% max) 25.75c per lb of contained chrome plus 12.4c per lb of contained silicon plus aluminum 2" x down, delivered.

Chromium Metal: (Min 97% Cr and 1% Fe) contract 1" x D, packed max 0.50% carload $1.12, ton lots $1.14, less ton $1.16. Delivered. Spot, add 5c. Prices on 0.10 per cent carbon grade, add 4c to above prices.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 35-55%, Si 8-12% max, C 3-3.5% max). Contract, any quantity, $3.00 per lb of contained V. Delivered. Spot, add 10c. **Crucible-Special Grades** (V 35-55%, Si 2-3.5% max, C 0.5-1% max) $3.10. **Primos and High Speed Grades** (V 35-55%, Si 1.50% max, C 0.20% max) $3.20.

Grainal: Vanadium Grainal No. 1, $1 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lots $1.28 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump bulk, 20.0c per lb of contained Si, packed 21.40c; ton lot 22.50c, f.o.b. Niagara Falls, freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump bulk, 12.0c per lb of contained Si, carload packed 14.0c, ton lot 15.4c, less ton 17.1c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 11.3c per lb of contained Si, carload packed 13.6c, ton lot 16.75c, less ton 18.0c. Delivered. Spot, add 0.8c.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 17.0c per lb of contained Si, carload packed 18.2c, ton lot 19.1c, less ton 20.2c. Delivered. Spot, add 0.2c.

Silicon Metal: (Min 97% Si and 1% max Fe) C1 lump, bulk, regular 18.5c per lb of Si, c.l. packed 19.7c, ton lot 20.6c, less ton 21.6c. Add 0.3c for max. 0.10% calcium grade. Deduct 0.3c for max 2% Fe grade analyzing min 96% Si. Spot, add 0.2c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe) Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.9c per lb of alloy, ton lots packed 11.30c, 20 to 1999 lb 11.95c, smaller lots 12.15c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 30-43%, Fe 40-45%, C 0.20% max). Contract, c.l. lump, bulk 8.0c per lb of alloy, c.l. packed 8.75c, ton lot 9.5c, less ton 10.35c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 20.25c per lb of alloy, ton lot 21c, less ton 22.25c. Freight allowed. Spot add 0.2c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered, spot add 5c. F.o.b. Washington, Pa., prices, 100 lb and over are as follows: Grade A (16-14% B) 7.5c per pound; Grade B (14-18% B) $1.20, Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $5.25 per lb contained B, delivered to destination.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 1 to 2%) contract, lump, carloads 9.0c per lb f.o.b. Suspension Bridge, N. Y. Freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 20.0c per lb of alloy, carload packed 20.8c, ton lot 22.3c, less ton 23.3c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 19.0c per lb of alloy, carload packed 20.2c, ton lot 22.1c, less ton 23.6c. Deld. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3¾ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 16.25c per lb of briquet, carload packed 16.95c, ton 17.75c, less ton 18.65c. Deld. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 12.45c per lb of briquet, c.l. packaged 13.25c, ton lot 14.05c, less ton 14.95c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ¾ lb of Si). Contract, c.l. bulk 12.65c, per lb of briquet, c.l. packaged 13.45c, ton lot 14.25c, less ton 15.15c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—Weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.95c per lb of briquet. Packed c.l. 7.75c, ton lot 8.85c, less ton 9.45c. Delivered. Spot, add 0.25c.
(Small size—Weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 7.1c. Packed c.l. 7.9c, ton lot 8.7c, less ton 9.6c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquetts: (Containing 2½ lb of Mo each) $1.14 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%), 10,000 lb W or more, $4.35 per lb of contained W; 2000 lb W to 10,000 lb W, $4.45; less than 2000 lb W, $4.57, f.o.b. Niagara Falls, N. Y.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 56-60%, Si 8% max, C 0.4% max) Contract, ton lot, 2" x D, $6.40 per lb of contained Cb, less ton $6.45. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb and Ta 60% min, C 0.30% max) ton lots, 2" x D, $1.75 per lb of contained Cb plus Ta, deld.; less ton lots $1.80.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, B 0.35-0.75%). Carload packed, 1" x D, 4.5c per lb of alloy, ton lot 47c, less ton 49c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.) Contract, carload, packed, ¾" x 12 M, 17.5c per lb of alloy, ton lots 18.25c, less ton 19.5c. Deld. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C1 packed, 17.50c per lb of alloy; ton lots 18.50c, less ton lots 20c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-3 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 15c per lb of alloy; ton lots 16.50c; less ton lots 17.75c, f.o.b. Niagara Falls; freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al; bal. Fe). Lump, carload, bulk 14.50c. Packed c.l. 15.50c, ton lots, 15.75c, less ton lots, 16.25c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $3 for each 1% of P above or below the base); carloads, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb contained Mo, f.o.b. Langeloth, $1.32 in all sizes except powdered which is $1.41. Washington, Pa., furnace, any quantity $1.32.

Technical Molybdic-Oxide: Per lb. contained Mo, f.o.b. Langeloth, Pa., $1.14 in cans; in bags, $1.13, f.o.b. Langeloth, Pa.; Washington, Pa., $1.13.

IN THE production of stainless steels, the trend is toward closer controls of analysis through the use of quality master alloy ingot. Our ALLOYMET 2115 ingot (70% Nickel—10% Chrome) is fast becoming the standard of the industry as a basic raw material in the production of stainless steels.

When ALLOYMET 2115 is used in the melt, the analysis of the finished product is never in doubt. Compare this with a heat of 18-8 scrap . . . but no, there is no comparison. Scrap—no matter how good it may be—is still an imperfect commodity that is generated; not made to order. ALLOYMET 2115, on the other hand, is a master alloy made to rigid specifications under the supervision of trained metallurgists who know the needs of the steel industry.

Steel producers are rapidly learning that to use master alloys in the place of scrap costs so very little more. Prove this by your own use.

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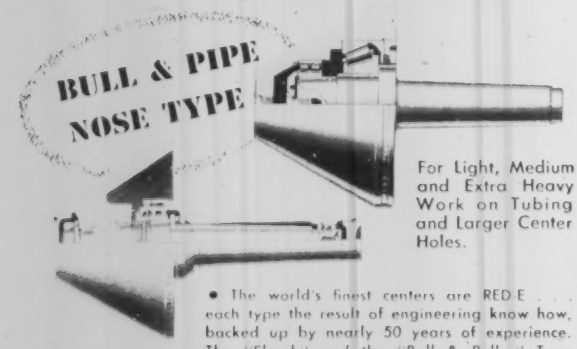

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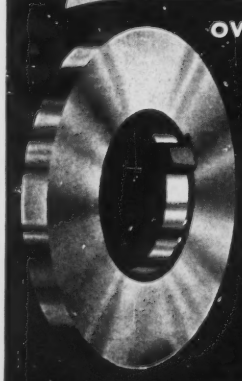

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ORES-COKE-REFRACTORIES

Prices as reported to STEEL; *changes shown in italics.*

ORES

Lake Superior Iron Ore

(Prices effective July 1, 1953, and thereafter; gross ton, 51.50% iron natural rail of vessel, lower lake ports.)

Old range bessemer	$10.30
Old range nonbessemer	10.15
Mesabi bessemer	10.05
Mesabi nonbessemer	9.90
Open-hearth lump	11.15
High phosphorus	9.90

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon which were in effect on June 24, 1953, and increases or decreases after such date are for buyer's account.

Eastern Local Iron Ore

Cents per unit dedt. E. Pa.

Foundry and basic 56-62% concentrates contract	17.00-18.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60-to-66% Spot	nom.
Long-term contract	22.00
North African hematite (spot)	24.00-26.00
Brazilian iron ore, 68-69% (spot)	25.00

Tungsten Ore

Net ton unit, duty paid

Foreign wolframite and scheelite, per net ton unit	$55.00
Domestic scheelite, mine	65.00

Manganese Ore

Manganese, 48% basis, $1.18-1.21 per long ton unit, c.i.f. U. S. ports, duty for buyer's account; shipments against old contracts for 48% ore are being received from some sources at 90.05c.

Chrome Ore

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African

48% 2.8:1	$40.00-$42.00
48% 3:1	44.00-46.00
48% no ratio	32.00-34.00

South African Transvaal

44% no ratio	$27.00-28.00
48% no ratio	34.00-35.00

Brazilian

44% 2.5:1 lump	nom. $32

Domestic

(Rail nearest seller)

48% 3:1	$39.00

Molybdenum

Sulphide concentrates per lb. molybdenum content, mines	$1.00

REFRACTORIES

Fire Clay Brick

High Heat Duty: Pueblo, Colo., $89.00; Ashland, Grant, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Oryston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., Woodbridge, N. J., $100.00; Salina, Pa., $114.00; Niles, O., $120; Los Angeles, Pittsburg, Calif., $132.30.

Silica Brick

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Portsmouth, O., $115; Warren, O., Hays, Pa., $120; Niles, O., $125; E. Chicago, Ind., Joliet, Rockdale, Ill., $125; Cutler, Utah, $116.55; Los Angeles, $122.85.

Insulating Fire Brick

2300° F.: Massillon, O., $178.50; Clearfield, Pa., $213; Augusta, Ga., Beaver Falls, Zelienople, Pa., Mexico, Mo., $200; Vandalia, Mo., $214.10; Portsmouth, O., $207.50; Bessemer, Ala., $212.80.

Ladle Brick

Dry Pressed: Bessemer, Ala., $64.60; Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Wellsville, O., $77.50; Mexico, Mo., $73.50; Clearfield, Pa., Portsmouth, O., $83; Perla, Ark., $100.00; Los Angeles, $110.25; Pittsburg, Calif., $111.30.

Sleeves

Reesdale, Pa., $139.70; Johnstown, Pa., $140.00; Clearfield, Pa., $148.50; St. Louis, $151.80; Athens, Tex., $153.00.

Nozzles

Reesdale, Pa., $223.50; Johnstown, Pa., $229.20; Clearfield, Pa., $241.10; St. Louis, $247.10; Athens, Tex., $247.50.

Runners

Reesdale, Pa., $174.00; Johnstown, Pa., $177.80; Clearfield, Pa., $185.50; St. Louis, $187.30; Athens, Tex., $191.80.

High Alumina Brick

50 Per Cent: Clearfield, Pa., St. Louis, Mexico, Mo., $179.00; Danville, Ill., $169.30.

60 Per Cent: St. Louis, Mexico, Vandalia, Mo., $223.00; Danville, Ill., $213.20.

70 Per Cent: St. Louis, Mexico, Vandalia, Mo., $255; Danville, Ill., $258; Clearfield, Pa., $252.

Dolomite

Domestic, dead-burned bulk; Bellmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Marble, Narlo, Gibsonburg, Woodville, O., $11.50; Thornton, McCook, Ill., $14.60; Dolly Siding, Bonne Terre, Mo., $13.65.

Magnesite

Domestic, deadburned bulk; Luning, Nev., $38.

METALLURGICAL COKE

Price per net ton

Beehive Ovens

Connellsville, furnace	$14.50-15.00
Connellsville, foundry	16.50-17.00
New River foundry	20.80
Wise county, foundry	15.95
Wise county, furnace	15.20

Oven Foundry Coke

Kearney, N. J., ovens	$21.00
Everett, Mass., ovens	
New England, del.	*26.00
Chicago ovens	24.50
Chicago, del.	26.00
Terre Haute, ovens	24.65
Milwaukee, ovens	25.25
Indianapolis, ovens	24.25
Chicago, del.	28.12
Cincinnati, del.	28.85
Painesville, O., ovens	25.50
Cleveland, del.	27.43
Erie, Pa., ovens	25.00
Birmingham, ovens	21.65
Cincinnati, del.	26.58
Lone Star, Tex., ovens	18.50
Philadelphia, ovens	23.95
Swedeland, Pa., ovens	23.85
St. Louis, ovens	
St. Louis, del.	26.00
St. Paul, ovens	23.75
Portsmouth, O., ovens	24.00
Cincinnati, del.	26.62
Detroit, ovens	25.50
Detroit, del.	26.50
Buffalo, del.	28.08
Flint, del.	28.23
Pontiac, del.	27.06
Saginaw, del.	28.58

*Or within $1.55 freight zone from works.

COAL CHEMICALS

Spot, cents per gallon, ovens

Pure benzol	36.00
Toluol, one deg.	30.00-33.00
Industrial xylol	30.00-33.50

Per ton, bulk, ovens

Sulphate of ammonia	$44.45
Birmingham area	$49.50

Cents per pound, ovens

Phenol, 40 c.l. nonreturnable drums	17.25

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3	40	27.25
4	40	26.00
5x6	40	25.75
6	60	23.25
7, 8, 9, 10	60	21.00
12, 14	72	20.50
16	72	20.00
17	60	20.50
18	72	20.50
20	72	20.00

CARBON

40	100	$8.95
40, 35, 30	110	8.95
30	84	9.10
24	90	8.90
24	72, 84	9.10
20	90	8.95
20	84	9.10
17	72	9.10
17	60	9.50
14	72	9.50
14, 12, 10	60	10.30
8	60	10.55

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138	288	500	1050	1600
150	300	550	1100	1650
163	313	600	1150	1700
175	325	650	1200	1750
188	338	700	1250	1800
200	350	750	1300	1850
213	363	800	1350	1900
225	375	850	1400	1950
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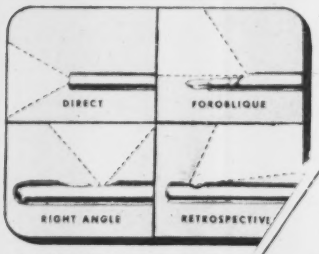

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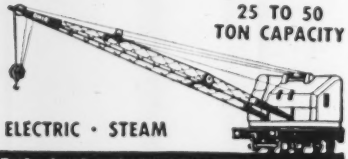

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Tubular Goods . . .

Tubular Goods Prices, Page 359

Philadelphia—Pipe supply has been increased by the initial production of continuous weld pipe at U. S. Steel's National Tube Division's plant at the Fairless Works, Fairless, Pa. Output began with the rolling of $1\frac{1}{2}$-inch pipe in the first of the two continuous pipe mills at the plant, annual capacity of which will be 281,000 tons.

Pittsburgh — Mechanical tubing sales are recovering from a decline due to inventory adjustments. The full decline expected didn't materialize and fourth quarter sales will probably be close to those in third quarter.

Pueblo, Colo. — Colorado Fuel & Iron Corp. shipped its first order of seamless tubing from its new $30 million pipe mill.

Seattle—Cast pipe inquiry is seasonally slow. Agencies are selling small lots and are in better position on deliveries.

Pig Iron . . .

Pig Iron Prices, Page 360

Cleveland—Merchant iron supply is adequate for all current requirements and sellers have to press a lot harder to get an order with the foundries largely buying only for needs in sight and holding down inventory.

"We have to do a little more sandbagging to get an order these days," one seller states, but he emphasizes that order volume is high when considered on the basis of normal requirements.

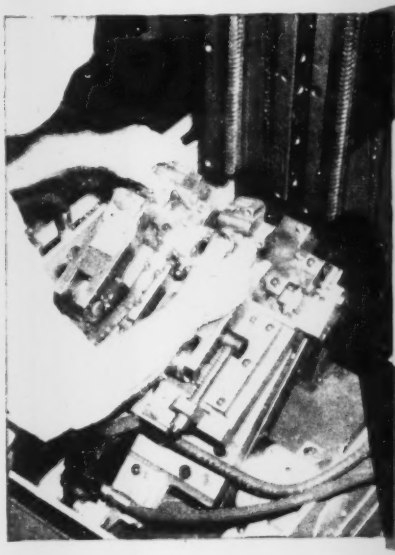
Pig iron prices are firm in this area, no shading or absorption of freight being reported.

In general, foundry operations are described as spotty, some shops operating at a fairly high level and others on reduced schedules. Automotive castings shops reportedly are doing much better than had been anticipated, while shops on farm implement castings are finding the going rough.

Boston—The slight decline in the Everett furnace's pig iron prices for fourth quarter alters the competitive factor little at western Massachusetts points. While reduction in prices by some Pennsylvania furnaces is larger, the movement of iron is not increasing materially.

New York—Pig iron business lags but prospects are a bit more encouraging. Some consumers' inventories are getting low.

Philadelphia—Pig iron sellers are a bit more encouraged over the outlook as consumer inventories are getting lower and most gray iron foundries



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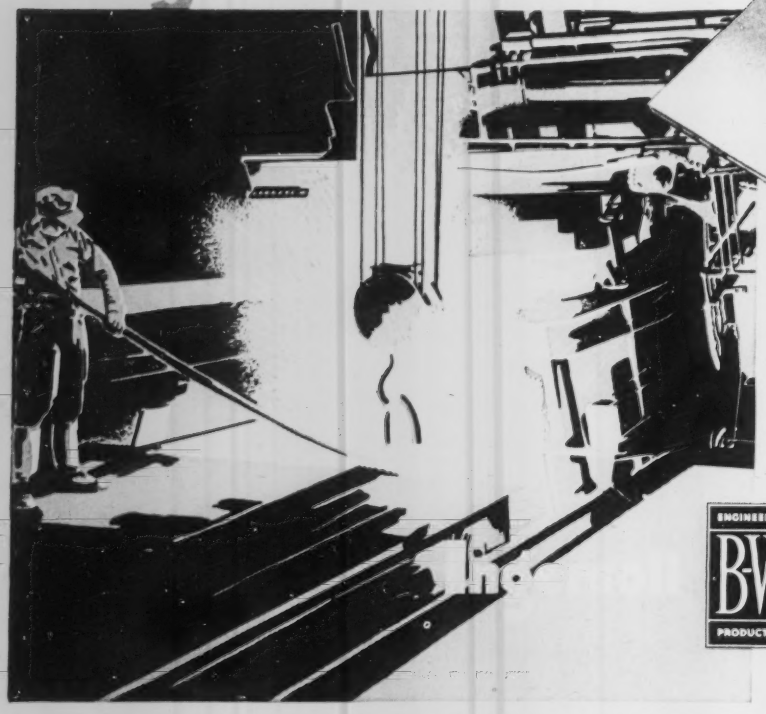

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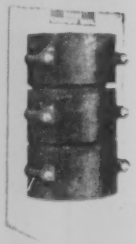

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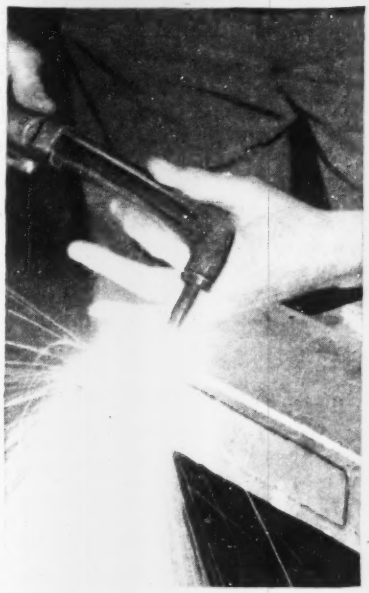

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THE MARK OF QUALITY — MARKAL

report inquiry for castings as being a shade stronger.

Iron supply will likely continue on the easy side for a while, especially with foreign iron offerings becoming increasingly competitive. Swedish high phos pig iron is reported being offered at around $47 on cars, Philadelphia, duty paid.

Buffalo—Mixed tendencies prevail in the merchant pig iron market but district production holds at theoretical capacity.

Pittsburgh—Small volume of orders is being filled in a slow market. Only ingot mold producers are ordering large quantities.

Cincinnati—Pig iron producers are reported holding heavy inventories which they are putting on the ground. Supplies are ample. Foundry operations vary widely.

Chicago—Requirements for ferrous castings have not come back as expected following the summer drop-off and the level of fourth quarter demand is now in question. Farm implement needs are down the most and now the automotive industry is tapering requirements. Effect is that pig iron supply is adequate.

St. Louis—Pig iron demand is down. One large casting firm closed in the wake of Chrysler's tank order cancellation, while two others have curtailed.

Scrap . . .

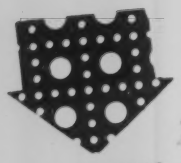
Scrap Prices, Page 380

Philadelphia—Open-hearth scrap prices have rebounded a little from the low of a week ago. One district mill has closed on a modest amount of No. 1 heavy melting steel at $31 to $32 delivered, and on No. 2 heavy melting at $29 to $30, the inside prices representing truck shipments. Some business in No. 2 bundles also is moving at higher levels, $27.50 to $28.50 delivered, the range in this case applying only to rail shipments.

Stiffening in the open-hearth grades reflects general feeling among sellers that the market, influenced by recent purchases at Fairless, Pa., had dropped lower than justified by supply. Some yards had decided to await an upturn in the market and figured that they could do so as their stocks were exceedingly low and would not prove costly to carry. Recently No. 1 heavy melting had dropped to $30 to $31 and No. 2 heavy melting to $27.

Most minor grades of steel scrap have shown relatively little change, pending a further test of the market. This also is true in the cast grades, except for heavy breakable which is higher at $38.50.

New York—Scrap business continues to thin out. There has been



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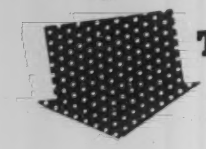
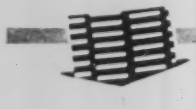


THE LEADERS IN INDUSTRY...



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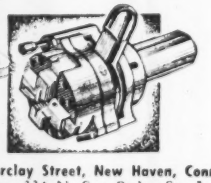

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STEEL can put you in touch with the important ones, those that do more than 92% of the industry's business. Tell the buyers and specifiers in these plants of the machines or materials you have for sale through an "Equipment—Materials" advertisement. For rates write STEEL, Penton Building, Cleveland 13, Ohio.

enough to stimulate prices on No. 2 heavy melting to a slightly higher level than a week ago, with brokers offering $22 to $23, and also to step up buying prices on No. 2 bundles to around $20 to $22. Prime grades are unchanged as is also low phos scrap. The principal grades of turnings and mixed borings and turnings are lower.

Buffalo—With the leading mills out of the market, scrap prices have slumped another $2 per ton. Hard pressed dealers report yard stocks piling up.

Pittsburgh—For the first time in seven weeks, scrap prices held fairly steady, only minor price changes being reported. Small volume purchases by mills are credited with halting the decline. No. 2 heavy melting gained $1 to $29 to $30, and No. 2 bundles advanced $1 to $27 to $28. Prices for stainless steel scrap are uncertain, awaiting the effect of lifting controls on nickel.

Cleveland—The scrap market has simmered down for the moment. Prices on all grades are unchanged from a week ago. Small lots are moving and dealers anticipate resumption of active buying by the mills shortly.

Although material continues to pile up in dealers' yards no distress selling is in evidence. Actually, strong feeling prevails in the trade that the market has about hit bottom and that some recovery to slightly higher levels can be expected over the next month or two.

Detroit — The scrap market continues weak here with only a few small quantity sales reported. Observers report some indications of a leveling off.

Chicago—Except for a few grades, scrap prices are holding at levels established by the recent mill purchase for October delivery. No. 1 dealer bundles are off $3 a ton to $27 delivered. Rerolling rails have slipped $7 in a matter of a few days. One consumer paid $43 a ton for this material.

Birmingham—Inactivity marks the scrap market here. Moderate tonnage is moving, most of it out of the district.

Los Angeles—Mills have reduced scrap buying prices $1 on all grades. No. 1 heavy melting is $23, No. 2 heavy melting is $19, No. 1 bundles $22, No. 2 bundles $19, and machine shop turnings $7.

San Francisco—Steel scrap prices cracked last week, dropping $2 to $1 a ton across the board.

Seattle—Steel mills here and in Portland, Oreg., last week reduced prices on No. 1 and No. 2 heavy melting scrap $2 per ton, the new levels being $29 and $27, respectively. Recently, purchases of heavy tonnages were made at $33 and $31. Bundles are in excess supply and are being quoted $4 lower.

Receipts are ample for current requirements but dealers are not shipping in volume, hoping for better prices. Cast iron scrap prices are unchanged.

Steel Imports Slacken

New York—Finished steel imports, following a rise in second quarter, have leveled off and currently show little over-all change. An exception is cold sheets, movement of which has ceased almost entirely due to letup in automotive requirements and the fact foreign prices are much above domestic levels. One interest doubts it can bring cold sheets into this country at less than 7.50c, landed, duty paid.

Plates have shown some decline. There was a substantial movement last spring but the trend started tapering in July and continued downward through August.

Among more active items are reinforcing bars and shapes. Wide flange sections are in particularly strong demand and importers could do much more business if they had a wider variety of these shapes to offer. Oil

QUANTITY PRODUCTION OF GREY IRON CASTINGS

ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES

ESTABLISHED 1866
THE WHELAND COMPANY
CHATTANOOGA 2, TENN.

(Advertisement)

WELDED DESIGN ELIMINATES BREAKAGE CUTS COST 78%

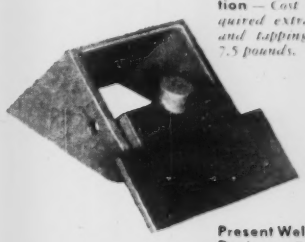
SINCE steel is a ductile material, it withstands shock loads without fracture. As a result, to eliminate shock failures, machine components can be simply changed to welded steel construction. At the same time, manufacture is made simpler, material cost is less, and fewer manhours are needed for production to cut costs an average of 50%.

The Problem

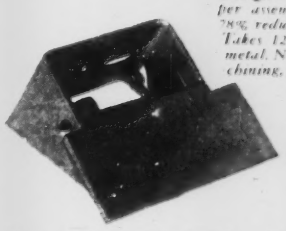
In the examples shown, breakage in the flipper assembly created service problems for this company. Because of limited clearance, it was impossible to increase wall sections.

The Solution

By converting to welded steel construction, the manufacturer was able to eliminate breakage completely, yet cut his cost from $4.50 to $1.00 per unit. The one and one half pounds less metal now needed actually produces a stronger, more rigid assembly than possible before. The entire unit is produced in the shop without waiting for outside sources. With less machining and less cleaning, fewer manhours are required to turn out a more dependable product.



Original Construction — *Cost $4.50, required extra drilling and tapping. Weight 7.5 pounds.*



Present Welded Steel Design — *Saves $3.50 per assembly . . . a 78% reduction in cost. Takes 12 pounds less metal. Needs less machining, less cleaning.*

How to Design in Steel and Cut Costs

Lincoln design specialists throughout the country are equipped to train product designers and production engineers on how to simplify designs for low cost manufacture. Design bulletins are also available by writing on your letterhead to Dept. 1610.

THE LINCOLN ELECTRIC COMPANY
Cleveland 17, Ohio
THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

STEEL IMPORT PRICES

(Base Per 100 Lb. Landed, Duty Paid)

	North Atlantic	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM A-305	$4.89	$4.91	$4.96	$5.14
Bar Size Angles	4.53	4.61	4.53	4.81
Structural Angles	4.53	4.61	4.53	4.81
I Beams	4.49	4.58	4.50	5.08
Wide Flange Beams	4.91	5.02	4.94	5.22
Sheet and Plate, 10 gage, 12 gage 72" x 10'	5.54	5.64	5.57	6.24
Fabric Channels, C.R., 3x0.75 x 0.20 lbs. per ft.	21.30	21.41	21.30	22.14
Rebar, Mesh	5.10	5.12	5.10	6.32
Merchant Bars	4.81	4.89	4.81	5.60
Hot Rolled Bands	4.57	4.69	4.57	5.26
Wire Rods, Thomas Commercial Quality	4.65	4.73	4.73	5.00
Wire Rods, O.H. Cod Bessemer Quality	5.11	5.21	5.19	5.46
Channels	4.50	4.58	4.50	5.08
Bright, Common Wire, Nails, 4d	6.40	6.50	6.43	6.70
Seamless A.P.I. Casing, Grade J-55				

Size O.D.	Wgt. Foot Lb.	Gulf Port	West Coast	Vancouver
5"	15.5	$1.47.11	$1.51.11	$1.52.11
7"	23	2.20.11	2.17.11	1.90.11
Seamless N-80 Casing				
5"	17	1.42.11	2.00.11	1.75.11
7"	23	2.30.11	2.70.11	2.36.11
Seamless J-55 Tubing				
2"	4.7	0.60.11	0.65.11	0.55.11
2½"	6.5	0.80.11	0.84.11	0.73.11

Source of Shipment: Western continental European (Schuman Plan) countries

country tubular goods are in fairly good demand; also nails and wire rods both of which are priced at levels below the domestic market.

In general, foreign prices are becoming increasingly competitive along the seaboard, although on most major items they are still somewhat higher than the domestic market here. Particular exceptions are in rods and nails, and barbed wire and bar sized angles.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

366 tons, medical and surgical building, Manhattan State Hospital, Wards Island, New York, through Lasker-Goldman Corp. to American Bridge Division, United States Steel Corp., Pittsburgh.

3000 tons, bridge superstructure, Westfield River, Agawam, Mass., to Harris Structural Steel Co., New York; bids Sept. 29.

2000 tons, Kingston steam plant, Tennessee Tennessee Valley Authority, to Ingalls Iron Works Inc., Birmingham.

1900 tons, John Sevier steam plant, Tennessee Tennessee Valley Authority, to Ingalls Iron Works Inc., Birmingham.

900 tons, state bridge, Lycoming county, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

730 tons, John Wanamaker store, Wynnewood, Pa., through Irwin & Leighton, Philadelphia, general contractor, to Bethlehem Fabricators, Bethlehem, Pa.

414 tons, state bridge, Onondaga county, New York, through Brunelli Construction Co., to American Bridge Division, United States Steel Corp., Pittsburgh.

405 tons, state bridge, York county, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

328 tons, state bridge, Newark, N. J., through P. T. Cox Construction Co., to Bethlehem Steel Co.

214 tons, Spokane, Wash., coliseum, to Bethlehem Pacific Coast Steel Corp., Seattle. Henry George & Sons, Spokane, general contractors, low $1,070,813.

230 tons, transmission towers, Anaconda Aluminum Co., Columbia Falls, Mont., to American Bridge Division, United States Steel Corp., Pittsburgh.

225 tons, warehouse, General Electric Co., Philadelphia, to Anthracite Bridge Co., Scranton, Pa.

220 tons, Colbert steam plant, Alabama, Tennessee Valley Authority, to Nashville Bridge Co., Nashville, Tenn.

180 tons, bottling plant, Pepsi-Cola Co., Milwaukee, to Milwaukee Bridge Co., that city.

175 tons, state bridge, Columbia county, New York, through Brunelli Construction Co., to Phoenix Bridge Co., Phoenixville, Pa.

126 tons, Harlem River drive alterations, New York, through Allen & Spooner & Sons Inc. to Bethlehem Steel Co.

114 tons, clinker storage building for Superior Portland Cement Co., Concrete, Wash., to Pacific Car & Foundry Co., Seattle.

STRUCTURAL STEEL PENDING

2,500 tons, power house expansion, Connecticut Light & Power Co., Devon, Conn.

1243 tons, state bridge work, Luzerne and Lackawanna counties, Pa., bids Oct. 21; also 327 tons of bars.

700 tons, factory building, W. T. Grant Co., Flushing, L. I., bids asked.

472 tons, state bridge work, Philadelphia

mechanical
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ALL INDUSTRIES
ZEH & HAHNEMANN CO.
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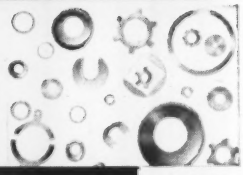

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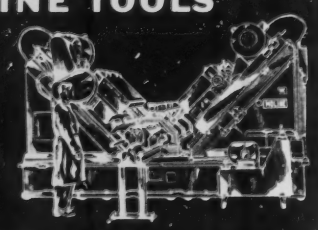

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WELDED and COLD DRAWN

STAINLESS STEEL

• And other heat and corrosion resistant alloys—made with Quality Control through every step of manufacture.

CUSTOMERS SAY: "Best fabricating and machining qualities we ever had."

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WARD STEEL CO.

We specialize in FINISHED STEEL BARS—TUBES—STRIP

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Fenner Street, Providence, R. I.
Phone: Gaspee 1-5573, 1-8573

county, Pa., bids Oct. 21; also 2088 tons of reinforcing bars.

300 tons, state highway bridge, Bedford, Mass.; George Brox Inc., Judson, Mass., low on general contract.

185 tons, state bridge work, Lawrence county, Pa., bids Oct. 23.

125 tons, state highway bridge, Piscataquis river, Guilford, Me.; bids Oct. 14, Augusta, Me.

165 tons, 3-span continuous WF beam bridge, Saxtons river, Rockingham, Vt.; bids Oct. 15, Montpelier, Vt.; also 40 tons reinforcing steel.

100 tons, two state bridges, Merrimack, N. H.; bids in.

REINFORCING BARS . . .

REINFORCING BARS PLACED

160 tons, Spokane, Wash., Coliseum, to Bethlehem Pacific Coast Steel Corp., Seattle.

100 tons, Benson apartments, Philadelphia, through the Keystone Concrete Co. to the American Steel Engineering Co., Philadelphia.

217 tons, Washington state overcrossing, to Bethlehem Pacific Coast Steel Corp., Seattle; Lockvear & White, Longview, general contractors.

100 tons, bridge approach, Pasco, Wash., state project, to Northwest Steel Rolling Mills Inc., Seattle; Sather & Sons, general contractors.

100 tons, Washington state highway projects, to Bethlehem Pacific Coast Steel Corp., Seattle.

100 tons, addition, Red Lion plant, Budd Co., Philadelphia, through Wark Co. to the American Steel Engineering Co., Philadelphia.

REINFORCING BARS PENDING

2225 tons, state highways and bridges, Ohio turnpike, Cuyahoga and Summit counties; bids Oct. 20, Columbus; also 7,44,000 square yards 10-inch reinforced concrete pavement.

2055 tons, state bridge work, Philadelphia county, Pa., bids Oct. 23; also 672 tons of shapes.

1793 tons, Garden State parkway, Atlantic county, N. J., comprising two contracts which could be figured jointly or separately, bids closed Oct. 9. This job was erroneously listed in the Sept. 28 issue under structural shapes.

1600 tons, 18-story state office building, Harrisburg, Pa., Nov. 3; also an estimated 300 tons of shapes.

1340 tons, highways and bridges, Ohio turnpike, Sandusky county; bids Oct. 20, Ohio Turnpike Commission, Columbus, O.

300 tons, repairs to feeder canal, Coulee dam reclamation project; bids to Bureau of Reclamation, Coulee Dam, Oct. 15.

117 tons, Garden State parkway, contract No. 100, section 11, Atlantic county, New Jersey, bids Oct. 27.

PLATES . . .

PLATES PLACED

1000 tons, oil storage tanks, Elmendorf Air Base, Alaska, to Pittsburgh-Des Moines Steel Co., Pittsburgh; S. Birch & Sons, Seattle, general contractors.

PLATES PENDING

3000 tons or more, intake gates and other equipment, The Dalles dam, Oregon; bid date unstated by U. S. Engineer, Portland, Ore.

700 tons, water system pipeline extension, Seattle; bid call planned for immediate future.

300 tons, including shapes, 310-ft ferry for Washington Toll Bridge Authority; bids in at Seattle.

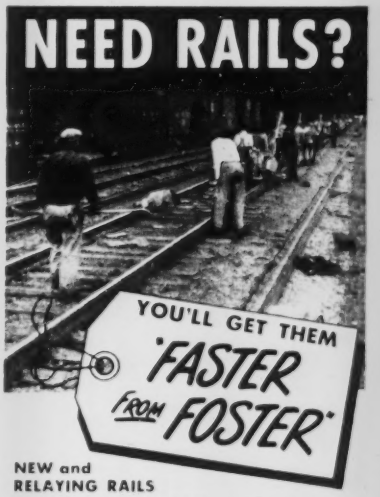
RAILS, CARS . . .

RAILROAD CARS PLACED

Chicago & Northwestern, 16 double-deck air-conditioned passenger coaches for suburban service, to St. Louis Car Co., St. Louis.

RAILROAD CARS PENDING

New York City Transit Authority, 200 passenger cars and 10 extra trucks; bids closed Oct. 5.



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AMERICAN CHEMICAL PAINT CO.
AMBLER, PA.

IRON AND STEEL SCRAP

Consumer prices, per gross ton, except as otherwise noted, including broker's commissions, as reported to STEEL. Changes shown in italics.

STEELMAKING SCRAP COMPOSITE

Oct. 8	$31.83
Oct. 1	31.50
Sept. avg.	36.93
Oct. 1952	43.00
Oct. 1948	43.25

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

(Delivered consumer plants)

No. 1 heavy melting	34.00-35.00
No. 2 heavy melting	29.00-30.00
No. 1 bundles	34.00-35.00
No. 2 bundles	27.00-28.00
No. 1 bushelling	33.00-36.00
Machine shop turnings	20.00-21.00
Mixed borings, turnings	20.00-21.00
Short shovel turnings	23.00-24.00
Cast iron borings	23.00-24.00
Cut structurals	38.00-39.00
Heavy turnings	29.00-30.00
Punchings & plate scrap	38.00-39.00
Electric furnace bundles	38.00-39.00

Cast Iron Grades

No. 1 cupola	39.00-40.00
Charging box cast	38.00-39.00
Heavy breakable cast	36.00-37.00
Unstripped motor blocks	33.00-34.00
No. 1 machinery cast	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	40.00-41.00
Rails, 2-ft and under	34.00-35.00
Rails, 18-in. and under	32.00-33.00
Rails, random lengths	*43.00-45.00*
Railroad specialties	*42.00-43.00*

Stainless Steel Scrap

18-8 bundles & solids	165-170
18-8 turnings	90-95
430 bundles & solids	72-80
430 turnings	50-62

CLEVELAND

(Delivered consumer plants)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	22.00-23.00
No. 1 bundles	31.00-32.00
No. 2 bundles	21.00-22.00
No. 1 bushelling	30.00-31.00
Machine shop turnings	16.00-17.00
Mixed borings, turnings	21.00-22.00
Short shovel turnings	21.00-22.00
Cast iron borings	21.00-22.00
Low phos.	31.00-32.00
Alloy free, short shovel turnings	24.00-25.00
Electric furnace bundles	32.00-33.00

Cast Iron Grades

No. 1 cupola	39.00-40.00
Charging box cast	28.00-29.00
Stove plate	36.00-37.00
Heavy breakable cast	26.00-27.00
Unstripped motor blocks	22.00-23.00
Brake shoes	28.00-29.00
Clean auto cast	39.00-40.00
No. 1 wheels	30.00-31.00
Burnt cast	26.00-30.00
Drop broken machinery	*45.00-46.00*

Railroad Scrap

No. 1 R.R. heavy melt	35.00-36.00
R.R. malleable	45.00-46.00
Rails, 3-ft and under	49.00-50.00
Rails, 18 in. and under	50.00-51.00
Rails, random lengths	42.00-43.00
Cast steel	43.00-44.00
Railroad specialties	*40.00-41.00*
Uncut tires	39.00-40.00
Angles, splice bars	*44.00-45.00*
Rails, rerolling	49.00-50.00

Stainless Steel

(F.o.b. shipping point)

18-8 bundles, solids	nom. 160.00-170.00
18-8 turnings	nom. 70.00-80.00
430 clips, bundles, solids	nom. 70.00
430 turnings	nom. 50.00

YOUNGSTOWN

(Delivered consumer plants)

No. 1 heavy melting	*35.00-37.00*
No. 2 heavy melting	*27.00-28.00*
No. 1 bundles	34.00-35.00
No. 2 bundles	25.00-26.00
Machine shop turnings	16.00-17.00
Short shovel turnings	24.00-25.00
Cast iron borings	24.00-25.00
Low phos.	35.00-36.00
Electric furnace bundles	35.00-36.00

Railroad Scrap

No. 1 R.R. heavy melt	36.00-37.00

PHILADELPHIA

(Delivered consumer plants)

No. 1 heavy melting	*41.00-42.00*
No. 2 heavy melting	*29.00-30.00*
No. 1 bundles	*41.00-42.00*
No. 2 bundles	*27.50-28.50*
No. 1 bushelling	*41.00-42.00*
Electric furnace bundles	32.00-33.00
Machine shop turnings	*19.00-20.00*
Mixed borings, turnings	22.00-23.00
Short shovel turnings	*26.00*
Structurals & plate	36.00-37.00
Heavy turnings	30.00
Coilers, spring, wheels	41.00-42.00
Rail crops, 2-ft & under	44.00-45.00

Cast Iron Grades

No. 1 cupola	35.00-36.00
Charging box cast	nom.
Heavy breakable cast	*38.50*
Unstripped motor blocks	28.00
Drop broken machinery	40.00-41.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	24.00-25.00
No. 2 heavy melting	*22.00-23.00*
No. 1 bundles	24.00-25.00
No. 2 bundles	*20.00-22.00*
Machine shop turnings	*11.50-12.00*
Mixed, borings, short turnings	*13.50-14.00*
Low phos. (structural & plates)	27.00-29.00
Short shovel turnings	*14.50-15.00*

Cast Iron Grades

No. 1 cupola	*29.00-30.00*
Unstripped motor blocks	21.00-22.00

Stainless Steel

18-8 sheets, clips, solids	160.00-165.00
18-8 borings, turnings	90.00
430 sheets, clips, solids	80.00-85.00
410 sheets, clips, solids	70.00-75.00

BOSTON

(Brokers' buying prices, f.o.b. shipping point)

No. 1 heavy melting	24.00-25.00
No. 2 heavy melting	20.00-21.00
No. 1 bundles	24.00-25.00
No. 2 bundles	18.00-19.00
Machine shop turnings	10.50-11.00
Mixed borings, turnings	15.50-16.00
Short shovel turnings	16.00-16.50
No. 1 cast	29.00-30.00
Mixed cupola cast	27.00-28.00
No. 1 machinery cast	36.00-37.00

CINCINNATI

(Brokers' buying prices)

No. 1 heavy melting	*30.00-31.00*
No. 2 heavy melting	*24.00-25.00*
No. 1 bundles	*30.00-31.00*
No. 2 bundles	*21.00-22.00*
No. 1 bushelling	*30.00-31.00*
Machine shop turnings	*11.00-12.00**
Mixed borings, turnings	*14.00-15.00**
Short shovel turnings	15.00-16.00*
Cast iron borings	*14.00-15.00**

Cast Iron Grades

No. 1 cupola	*41.00*
Charging box cast	*31.00-32.00*
Heavy breakable cast	*34.00-35.00*
Drop broken machinery	*46.00-47.00*

Railroad Scrap

No. 1 R.R., heavy melt.	*32.00-33.00*
Malleable	*42.00-43.00*
Rails, 18-in. and under	48.00-49.00
Rails, random lengths	39.00-40.00

*F.o.b. shipping point.

CHICAGO

No. 1 heavy melting	29.00-30.00
No. 2 heavy melting	24.00-25.00
No. 1 factory bundles	30.00-31.00
No. 1 dealer bundles	*26.00-27.00*
No. 2 bundles	22.00-23.00
No. 1 bushelling	29.00-30.00
Machine shop turnings	14.00-15.00
Mixed borings, turnings	14.00-15.00
Short shovel turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut structurals, 3-ft	32.00-33.00
Punchings & plate scrap	32.00-33.00
Electric furnace bundles	32.00-33.00

Cast Iron Grades

No. 1 cupola	32.00-33.00
Stove plate	26.00-27.00
Unstripped motor blocks	19.00-20.00
Clean auto cast	36.00-37.00
Drop broken machinery	35.00-37.00

Railroad Scrap

No. 1 R.R. heavy melt	*41.00-42.00*
R.R. Malleable	40.00-41.00
Rails, 2-ft and under	43.00-45.00
Rails, 18-in. and under	44.00-46.00
Angles, splice bars	40.00-42.00
Rails, rerolling	*42.00-43.00*

DETROIT

No. 1 heavy melting	26.00
No. 2 heavy melting	23.00
No. 1 bundles	26.00
No. 2 bundles	23.00
No. 1 bushelling	26.00
Machine shop turnings	12.00
Mixed borings turnings	12.00
Short shovel turnings	14.00
Punchings & plate scrap	30.00

Cast Iron Grades

No. 1 cupola	40.00
Charging box cast	33.00
Stove plate	34.00-35.00
Heavy breakable	29.00-30.00
Unstripped motor blocks	30.00
Clean auto cast	40.00
Malleable	40.00

BIRMINGHAM

No. 1 heavy melting	26.00-26.50
No. 2 heavy melting	24.00-24.50
No. 1 bundles	26.00-26.50
No. 2 bundles	22.00-22.50
Machine shop turnings	19.50-20.50
Short shovel turnings	21.50-22.50
Cast iron borings	17.00-17.50
Cut structurals	nom.
Electric furnace bundles	nom.

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	41.00-42.50
Charging box cast	30.00-31.00
Stove plate	38.00-39.00
Bar crops and plate	38.00-39.00
Cut structurals	36.00-37.00
Heavy breakable cast	30.00-31.00
Unstripped motor blocks	34.00-35.00
No. 1 wheels	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	nom.
Rails, 2-ft and under	42.00-43.00
Rails, random lengths	39.00-40.00
Angles, splice bars	45.00-46.00
Rails, rerolling	46.00-47.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	*28.00-29.00*
No. 2 heavy melting	*23.00-24.00*
No. 1 bundles	*28.00-29.00*
No. 2 bundles	*21.00-22.00*
Machine shop turnings	*11.00-12.00*
Short shovel turnings	*12.00-13.00*

Cast Iron Grades

No. 1 cupola	*36.00-37.00*
Charging box cast	*27.00-28.00*
Heavy breakable cast	*27.00-28.00*
Unstripped motor blocks	*27.00-28.00*
Brake shoes	*36.00-37.00*
Clean auto cast	*37.00-38.00*
Burnt cast	*28.00-29.00*

Railroad Scrap

Malleable	*37.00-38.00*
Rails, 18-in. and under	*44.00-45.00*
Rails, random lengths	*43.00-44.00*
Uncut tires	*31.50-32.50*
Angles, splice bars	*44.00-45.00*
Rails, rerolling	42.00-43.00

BUFFALO

No. 1 heavy melting	*33.00-34.00*
No. 2 heavy melting	*26.00-27.00*
No. 1 bundles	*33.00-34.00*
No. 2 bundles	*24.00-25.00*
No. 1 bushelling	*32.00-33.00*
Machine shop turnings	19.00-20.00
Mixed borings, turnings	20.00-21.00
Short shovel turnings	20.50-21.50
Cast iron borings	20.00-21.00
Low phos.	*35.00-36.00*

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	*32.00-33.00*
No. 1 machinery	*37.00-38.00*

Railroad Scrap

Rails, random lengths	*34.00-40.00*
Rails, 2-ft and under	*45.00-46.00*
Railroad specialties	*48.00-48.50*

SEATTLE

(Delivered consumer plants)

No. 1 heavy melting	*29.00*
No. 2 heavy melting	*27.00*
No. 1 bundles	*24.00*
No. 2 bundles	*19.00*
No. 3 bundles	*18.00*
Machine shop turnings	13.00
Mixed borings, turnings	13.00
Short shovel turnings	13.00
Electric furnace, No. 1	38.00-40.00

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	30.00-35.00
Heavy breakable cast	25.00-30.00
Unstripped motor blocks	27.00
No. 1 wheels	38.00-40.00
Stove plate	26.00

Railroad Scrap

Rails, random lengths	34.00-35.00

SAN FRANCISCO

No. 1 heavy melting	*24.00*
No. 2 heavy melting	*19.00*
No. 1 bundles	*22.00*
No. 2 bundles	*19.00*
No. 1 bushelling	*24.00*
Machine shop turnings	*7.00*
Mixed borings, turnings	*7.00*
Short shovel turnings	13.00
Cast iron borings	13.00
Cut structurals	32.00
Heavy turnings	13.00
Punchings & plate scrap	33.00
Electric furnace bundles	24.00

Cast Iron Grades

No. 1 cupola	39.00
Charging box cast	35.00
Stove plate	37.00
Heavy breakable cast	36.00
Unstripped motor blocks	29.00
Brake shoes	35.00
Clean auto cast	39.00
No. 1 wheels	39.00
Burnt cast	23.00
Drop broken machinery	43.00

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No. 1 heavy melting	*23.00*
No. 2 heavy melting	*19.00*
No. 1 bundles	*22.00*
No. 2 bundles	*19.00*
Machine shop turnings	*7.00*

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	37.00-40.00

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(Delivered prices)

Heavy melting	$32.50
No. 1 bundles	32.50
No. 2 bundles	32.50
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Mixed steel scrap	28.50
Mixed borings, turnings	26.50
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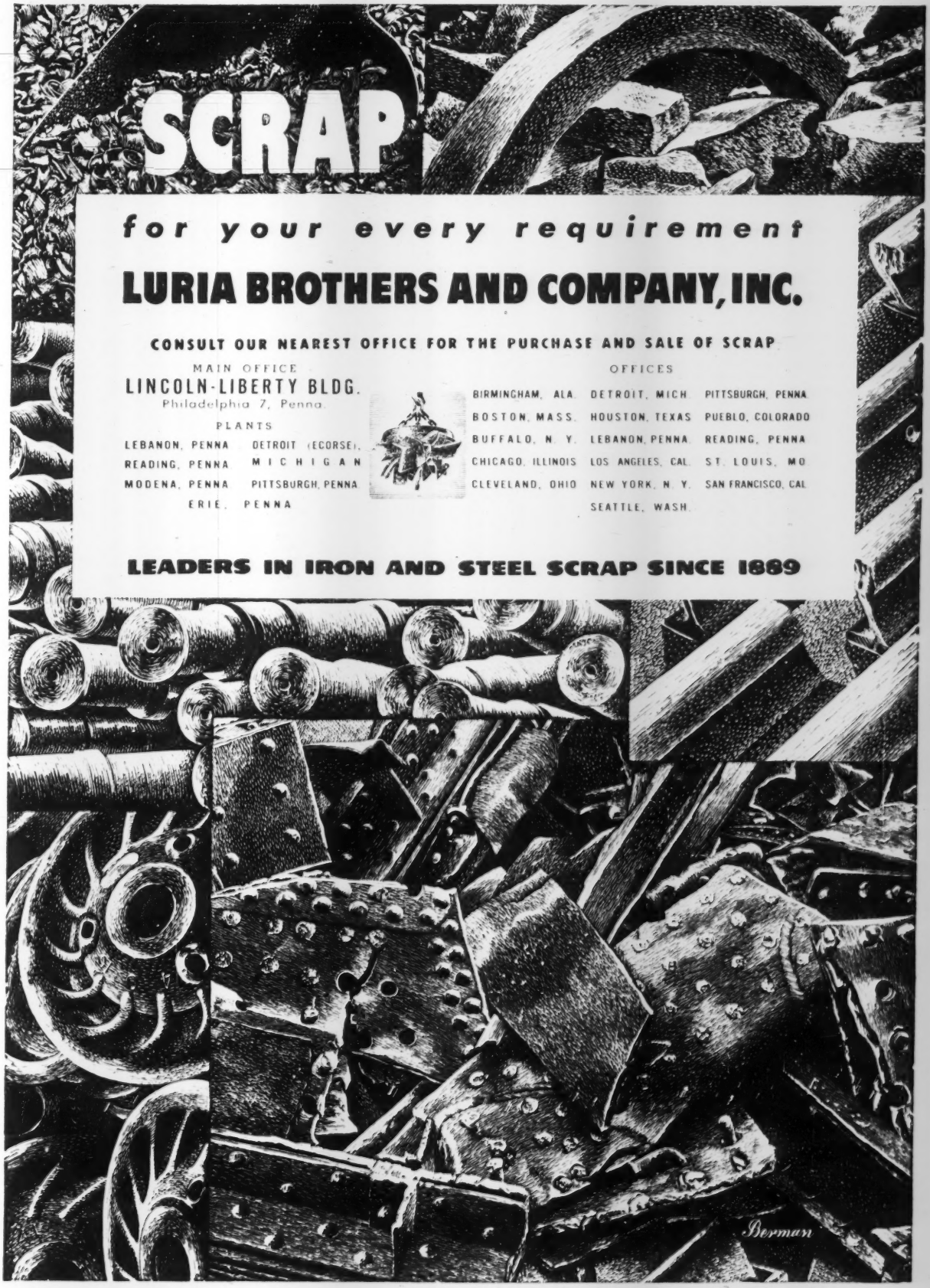
Rails, rerolling	41.50
Bushelling	26.50
Bushelling new factory:	
Prep'd	30.50
Unprep'd	28.50
Short steel turnings	22.50

Cast Iron Grades

No. 1 machinery cast	46.00-50.00

†F.o.b. shipping point.



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Statement required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 233) showing the ownership, management, and circulation of STEEL, published weekly, at Cleveland, Ohio, for October 1, 1953. 1. The names and address of the publisher, editor, managing editor, and business managers are: Publisher The Penton Publishing Co., 1213 West Third St., Cleveland 13, O. Editor, Irwin H. Such, 1213 West Third St., Cleveland 13, O. Managing editor, Walter J. Campbell, 1213 West Third St., Cleveland 13, O. Business manager, James W. Zuber, 1213 West Third St., Cleveland 13, O. 2. The owner is: The Penton Publishing Co., 1213 West Third st., Cleveland 13, Ohio. Names and addresses of stockholders owning or holding 1 percent or more of total amount of stock: Edwin C. Barringer, Washington, D. C.; Samuel E. Bod, Cleveland, Ohio; County National Bank and Trust Co. of Santa Barbara, Santa Barbara, Calif.; J. R. Dawley, Cleveland, Ohio; Mrs. Frances Penton Force, Lansing, Mich.; Mrs. Agnes T. Hays, Cleveland, Ohio; George O. Hays, Cleveland, Ohio; R. C. Jawke, Cleveland, Ohio; Irma F. Jasper, Pittsburgh, Pa.; A. L. Klingensmith, Cleveland, Ohio; J. D. Force, Mount Dora, Florida; Francis O. Rice, Cleveland, Ohio; E. L. Shuter, Cleveland, Ohio; Charles J. Stark, Cleveland, Ohio; Penelope M. Stark, Cleveland, Ohio; The Wean Engineering Co., Inc., Warren, Ohio; Edith L. Werner, Cleveland, Ohio; Grace Wheaton, Santa Barbara, Calif. 3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: New England Mutual Life Insurance Co., 501 Boylston Street, Boston 17, Mass. 4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner. 5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (Signed) Irwin H. Such. Sworn to and subscribed before me this 29th day of September, 1953. (Seal) Joseph P. Lipica. (My commission expires Sept. 9, 1955)

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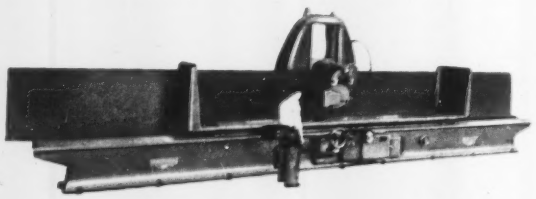

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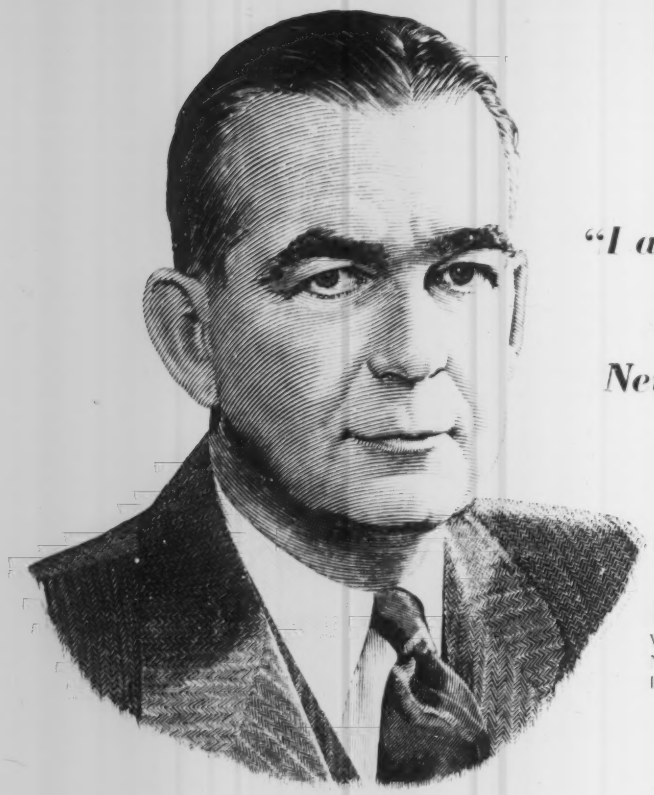

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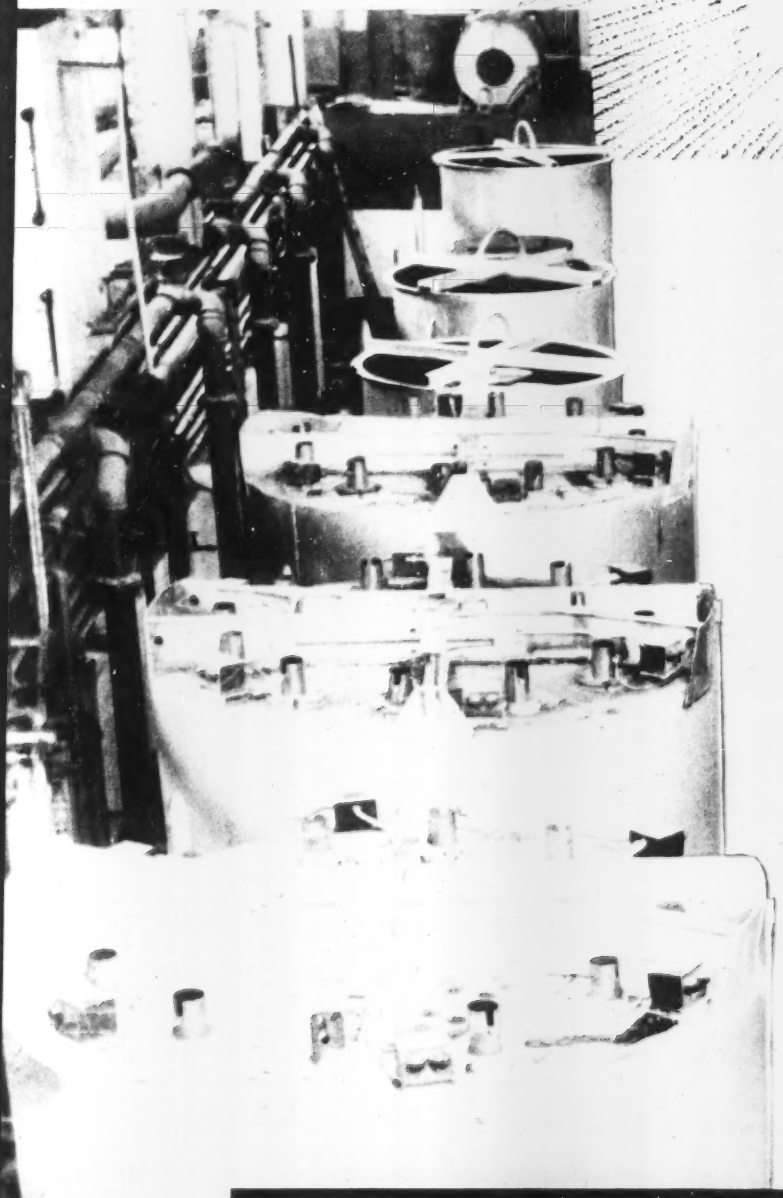
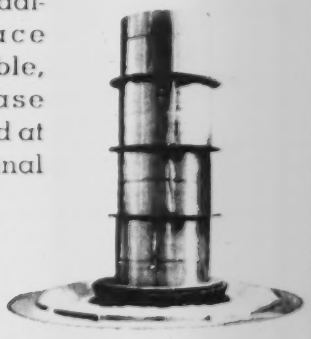
Annealing: Production Triples!



In this installation of three Lee Wilson radiant convector furnaces and eight bases with a charge size of 60" diameter and a piling height of 126", the tremendous efficiency of the Wilson radiant convector annealing system was demonstrated by increasing the yield from the same floor space by three times the original figure.

These units at Wallingford Steel Company at Wallingford, Connecticut are producing extremely uniform, high quality strip steel at an average production figure of 3800 tons per month. In a plant such as this where no additional space was available, this increase was achieved at a very nominal expense.



Lee Wilson

ENGINEERING Co., Inc.

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Telephone ED-1-6600

BELL TYPE FURNACES ★ RADIANT TUBE HEATING ★ ANNEALING PROCESSES

TIMKEN bearings cut starting resistance 88% on 200-ton ladle car

THIS special 200-ton ladle car in service at a large eastern steel plant is always ready to go because its wheels run on Timken tapered roller bearings.

Starting resistance is 88% lower than with friction bearings! That's because Timken bearings *roll* the load. There's no chance of metal-to-metal sliding friction. Less power is needed to get the loaded car started.

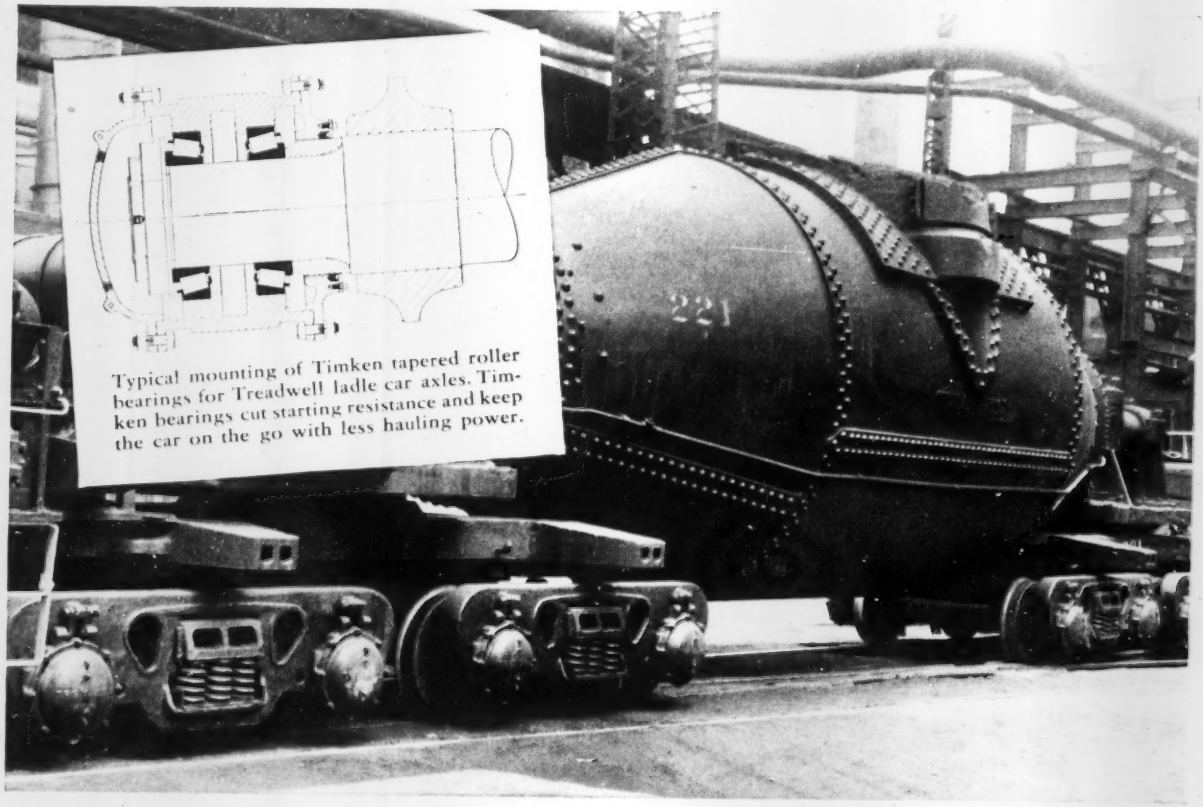
Line contact between rollers and races gives Timken bearings extra load-carrying capacity. Beneath their case-hardened surface, Timken bearings have tough, shock-resistant cores that let them take the heavy shock loads set up as the car moves over bumpy track.

And Timken bearings are *tapered* —they take any combination of radial and thrust loads without the need for costly auxiliary thrust devices.

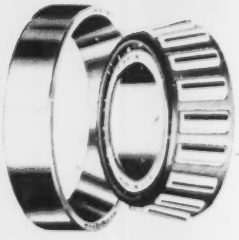
Whether you're building or buying mill equipment, make sure you get all the advantages only Timken bearings can give. Always look for the trade-mark "Timken" stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".

TIMKEN BEARING EQUIPPED

This symbol on a product means its bearings are the best.



Typical mounting of Timken tapered roller bearings for Treadwell ladle car axles. Timken bearings cut starting resistance and keep the car on the go with less hauling power.



TAPERED ROLLER BEARINGS

FINISHED TO CLOSER TOLERANCES

Finishing to incredible smoothness accounts for much of the precise, smooth rolling performance of Timken bearings. This honing operation is typical of the amazingly accurate manufacturing methods at the Timken Company.

The Timken Company is the acknowledged leader in: 1. advanced design, 2. precision manufacturing, 3. rigid quality control, 4. special analysis steels.

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